In This Issue— *Analysis of Automotive Distribution*

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# MOTOR AGE

Vol. XLI
Number 8

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, FEBRUARY 23, 1922

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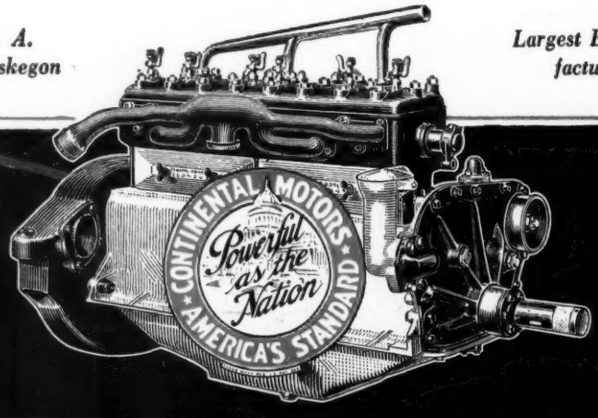


# Continental Motors

# MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING

59 East Madison Street, CHICAGO

Vol. XLI Chicago, Feb. 23, 1922 No. 8


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SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions ..... $ 3.00 per year
Canada ..... 5.00 per year
All Other Countries in Postal Union ..... 6.00 per year
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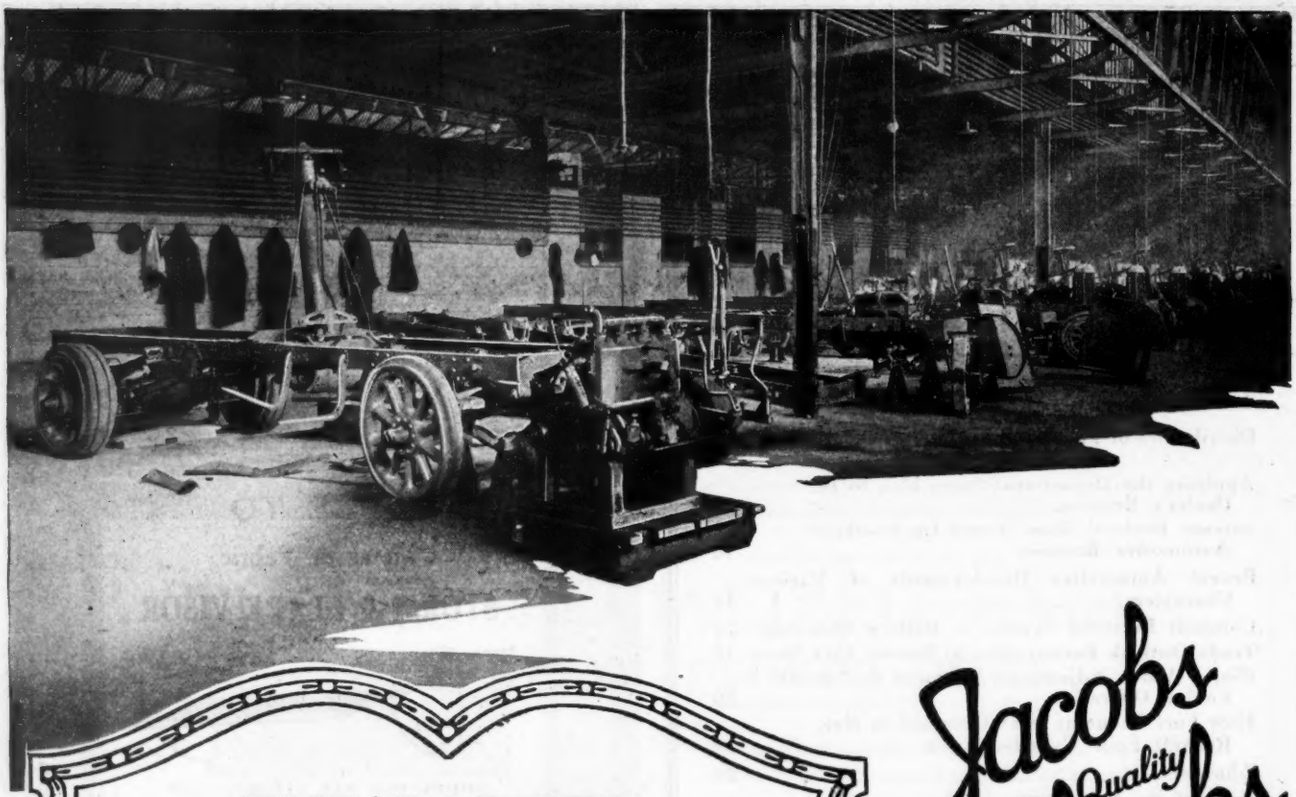


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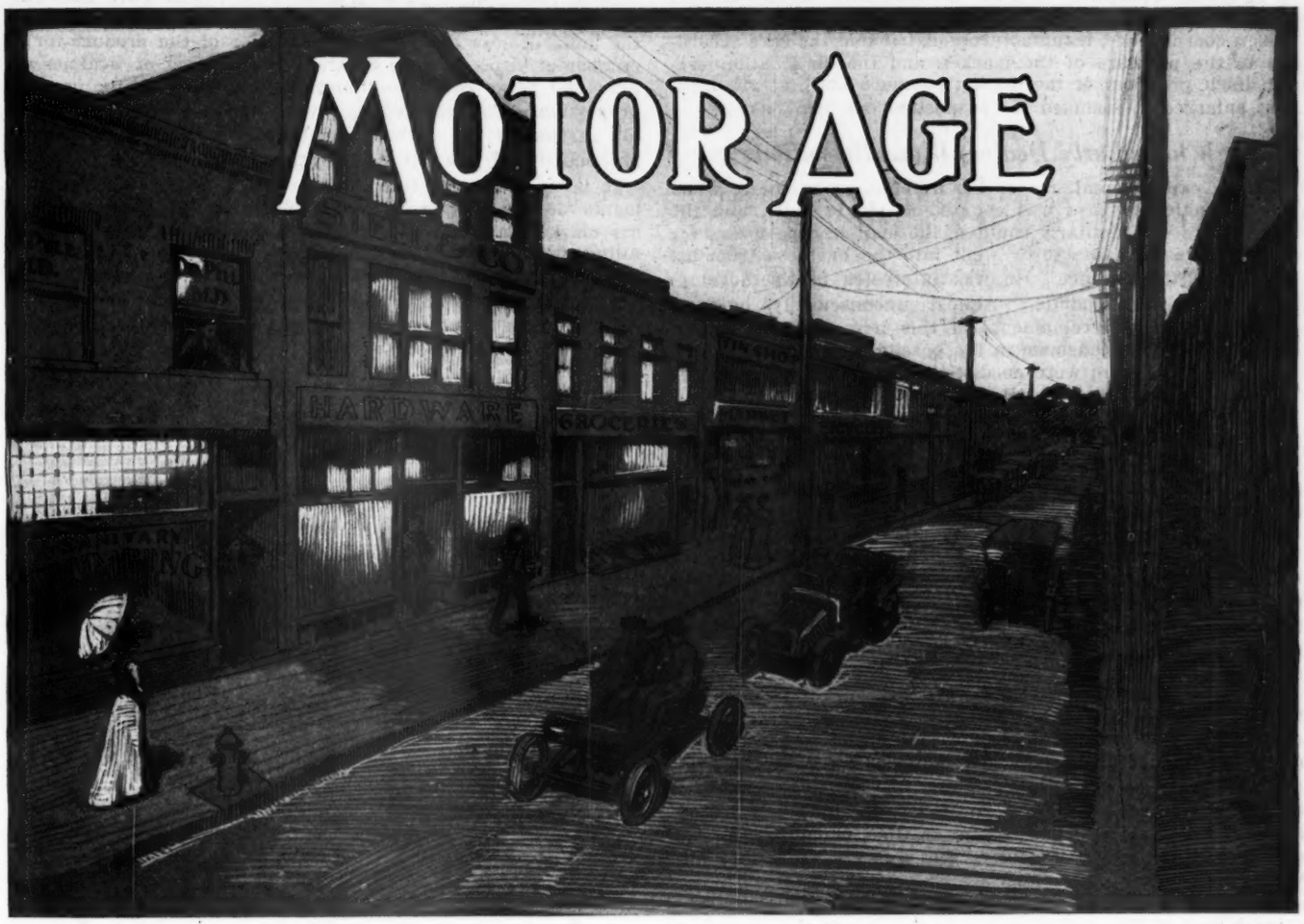



*Merchant Chorus:* Any one can make money selling cars.

# Distributors *or* Factory Branches?

## *THE First of a Series of Three Articles Discussing the Development and Economics of the Present Automotive Distribution System*

By HARRY TIPPER

THE present method of distributing the passenger car did not arise wholly out of the economic necessities as they exist in the fully developed business of today. In fact, the economic necessities of the present-day business are themselves entirely different from those necessities facing the manufacturer in the early days of the history of the automobile industry.

As in other lines of business growing rapidly into their place in the social or industrial fabric, the distribution of the product was carried out along the lines of least resistance and in response partly to the pressure from the potential market outside the manufacturer's establishment, and only partly from the manufacturer's conceptions as to the advisability. There was little or no necessity for the manufacturer to study the economics of distribution in those days, because the unsatisfied virgin market was waiting for the passenger car to come within reach and exerted a constant pressure upon the manufacturer to improve the vehicle itself and to enlarge his production possibilities so that the vehicle itself would be available to them.

This was the great time for the engineer and the production man, as the future of the business depended almost entirely upon their work. The automobile is the only product of modern industrial times that has fixed the public's attention upon itself at all moments of its use. Every automobile running in the streets or roads was a spur of so effective a nature

to the potential desire of those who did not own an automobile that the pressure of the market was very quickly felt as soon as the car became sufficiently reliable and produced in sufficient quantities to meet the demands of any section of the population.

As a consequence, manufacturers distributed the cars according to the pressure of the market, and the distribution system itself grew out of the market pressure until, as the business enlarged, it assumed the proportion existing today.

### *Where Early Dealers Were Recruited*

In the experimental era of the automotive business, when the production of cars was counted in single units, and the sale of cars was similarly counted, the man who sold cars for any individual manufacturer went into the business from his interest in the product. He was interested in the development of the automobile. Almost unconsciously he was dragged into the developments of this new business by the character of his enthusiasm in the possibilities of the product.

At this stage there were no distributors as they exist today. There were some few retail establishments selling automobiles, keeping them in order and keeping the sales rooms where the machines could be inspected. The men who sold cars in those days had to acquire sufficient knowledge to rescue them from their innumerable troubles and, in the course of that experience, they practically discovered a great many things not yet a part of the manufacturer's equipment of knowledge. By force of circumstances they became experts in the business, and the relation existing at that time is indicated by the fact that many of those distributors went into the manufacturing business later, while some of those in the manufacturing business went into the distribution field as the business developed.

As the automobile passed from the experimental stage and became available to a larger section of the virgin market, those dealers found it possible to sell a larger and larger number of cars. They received calls and inquiries for cars from the bicycle repair shops and other places in smaller communities in the trading area, and they began to develop into distributors, bringing those establishments in smaller communities into existence as dealers. Of course, this was not so in all individual cases.

In the establishment of a new business like this there was a great deal of flux and change going on in all the individual territories as they opened up, and in individual cases. People came into this business in the retail end and in all branches from all kinds of business and professional work because of their interest in the product. They were able to establish themselves with comparatively little money.

A number of those who were enthusiastic about the automobile projected themselves into the business, exerting their pressure upon the manufacturers and the older distributors who were included in the chain of distributing and merchandising the product itself. Naturally, these enthusiasts possessed an influence with the other members in their communities who were potential buyers of the product and a part of the virgin market. In those days the man who could own and successfully drive a car and keep it in shape was a man who possessed a considerable amount of knowledge in the eyes, at least, of those who had not yet summoned up sufficient courage to avail themselves of the possibility.

### *Distribution System That Has Developed*

Thus, in one way or another, partly because of the human reactions in the case, partly because of the extent of the virgin market, there has grown up a system of distribution comprising distributors, those who secure the cars from the manufacturers and who wholesale those cars to retailers, doing at the same time a retail business of their own; dealers who are doing a retail business in a restricted territory, and branches of the manufacturing establishments developed in large centers to meet the possibilities of those centers as markets.

It was obvious in the early stages of the business that the man who went into the selling and maintaining of an automobile would be obliged to confine his interests to one individual car or one or two non-competing cars, and the exclusive territory became a concomitant of this interest. Furthermore, the demand upon the dealer and distributor to maintain the cars in condition to perform their service was more insistent in the early days than it was in the later growth, because of the more or less experimental character of the product for a number of years and the constant development of weaknesses here and there in the building of production to its present proportions. As the product became stabilized, this necessity for service of the right character diminished somewhat in proportion and was partially overlooked.

It is necessary to consider the place of the various elements of distribution in the development of the passenger car market and its maintenance, to what extent they are fulfilling their functions, and the changes which must take place in order to meet the new requirements. In this examination the merchandising of the car must be expressed in its true relation to the maintenance of the car when it has been bought.

## Everybody Wanted One

Every automobile running in the streets or roads was a spur of so effective a nature to the potential desire of those who did not own an automobile that the pressure of the market was very quickly felt as soon as the car became sufficiently reliable and produced in sufficient quantities to meet the demands of any section of the population

The sale of an automobile is not concluded with the purchase of the machine, like the sale of a suit of clothes. It is purchased for service. The appearance of the car, its continued appearance, its reliability, the day-in-and-day-out efficiency for service, the amount of time which must be spent in repair and adjustment—are all elements in the sale of more and more importance as the virgin market is absorbed and the replacement market becomes a larger element of the future consideration. All the elements of distribution, therefore, must be considered from effectiveness in both developments and their functions determined for service as well as merchandising.

### *Four Merchandising Elements*

The present elements are (1) the factory branch; (2) the distributor; (3) the retailer; (4) the repair shop, which does no merchandising.

The factory branch functions entirely as a distributing point of a wholesale character, controlled by the manufacturer. It is not in any sense a factory branch from the standpoint of production unless cars are assembled at that point. It is altogether a warehouse point receiving the complete product

and redistributing it to the retailers or other elements in the distribution chain. The term "factory branch" is a misnomer, therefore, except as it refers to the financial control. It is really a distributing organization controlled by the factory, and it must function in this respect with an average efficiency equal to that provided by the independent competition. In other words, a factory sales branch, so called, must be able to pay its rent, its interest on the investment on its fixed charges, its sales work, its accounting, its warehousing and handling, and all the other elements which enter into the sale of the car for the same discount which would be allowed to the distributor of the same product were he an independent business man operating in that way.

The distributor of an automobile functions to the advantage of the factory in three ways:

1—By providing an orderly basis of production because of his ability to obligate himself for a large number of cars on a regular contract.

2—As a sales organization capable of exercising a more intensive contact with the retailers and of maintaining a better sales condition.

3—As a central service organization, capable of executing complicated repairs and adjustments with a definite standard of efficiency and price, and capable of seeing that the dealers are established to conduct the service for their more restricted areas.

The retailer functions with the automobile manufacturer because of the following advantages:

1—The ability to obligate himself for a definite number of cars over a definite period and to permit the factory to continue its future work with less speculation.

2—The ability to place the car conveniently for buying in a naturally restricted area adjacent to the trading center and to intensively operate sales work there.

3—The ability to make reasonable repairs and adjustments, keeping the car in service with less consumption of time and upon a decent basis of efficiency in the operations and the charges.

The exclusive repair shop, while it does not function as a part of the merchandising chain, is involved in the distribution of the car because of its ability to serve different makes of cars, particularly those models at present out of production; its influence in the choice of cars, and its contact with the users of cars make it a functional part of the chain of marketing in this field.

These several distributing functions must be performed for the manufacturer of cars, either by distributing depots financially controlled by the manufacturer or by independent organizations established for that purpose. The question as between those operations financially controlled by the manufacturer and those controlled by independent concerns is one of relative efficiency and cost entirely.

Bearing in mind that the marketing cost has a tendency to increase in proportion to the area covered from a single manufacturing unit, and the intensity of the competition in its group, the question of establishing factory branches should be approached with great care because the efficiency of such branches has a tendency to decrease in proportion to centralization of control.

### *Variation in Dealer Efficiency*

It is quite natural in the rapid growth of a business like the automotive business, supplying a virgin market with a manufacturing capacity unequal to its demand, until this last year, that the distribution system should show a great variation. The distribution system has grown with the same rapidity as the production of automobiles and has had a very high mortality rate, as in all new lines of business. Comparatively few dealers, distributors, repair shops or storage points have secured a long experience in the business, and the variation is not due to the weaknesses in the system or the fact that it does not function economically, but is more largely due to the conditions of its growth and the rapidity with which the business has expanded. It would be impossible for this business to present an orderly system of distribution, a fair standard of general efficiency or a fair degree of understanding as to its problems through all the elements of its distributing area, when the business has grown from almost nothing to a five thousand million dollar distributing proposition in twenty years.

Manufacturers should avoid any hasty conclusions as to the efficiency in the system or any hasty decisions to change the present system of distribution under which they are working without a careful examination of the functions and purposes, because the difficulties are almost altogether elements of the growth and not functional disorders.

***Part Two of the discussion, Distributors or Factory Branches? will be presented in the next issue. The third and last article will appear in the issue following that and will be an analysis of how the whole distribution system in the marketing of passenger cars hinges on the retail dealer.***

### An Interesting Analysis

**THE growth of the automotive industry, in a comparatively few years as industries go, has been extremely rapid and few persons realize what a tremendous business it has become.**

**It has grown from virtually nothing twenty years ago to the largest mercantile specialty in the country today and the development of the distribution structure is a vital and interesting study.**

**Harry Tipper, business manager of Automotive Industries, has prepared three articles analyzing this development of automotive merchandising methods. The articles appeared in Automotive Industries and are being presented in MOTOR AGE.**

**Mr. Tipper is a man of wide experience, having been president of the Associated Advertising Clubs of the World, and recently with the Texas Co. He is the author of several books on advertising and sales, among them "The New Business."**

**The analytical study of merchandising methods is of importance to the dealer and distributors who are vitally concerned in the future of this business. We know that these articles present a different phase of dealer questions than heretofore has been considered and we believe that they will not only prove highly interesting but extremely important to the automotive dealer.**

## BUFFALO MOTORS SHOW

Buffalo, Feb. 20—Under the auspices of the Automobile Club of Buffalo a motor and sportsmen's show will be held in the Broadway auditorium April 10-15. It is intended to have the exposition show a most comprehensive array of devices to which motors are applicable on land or sea or in the air.

## MONTREAL SHOW PROMISING

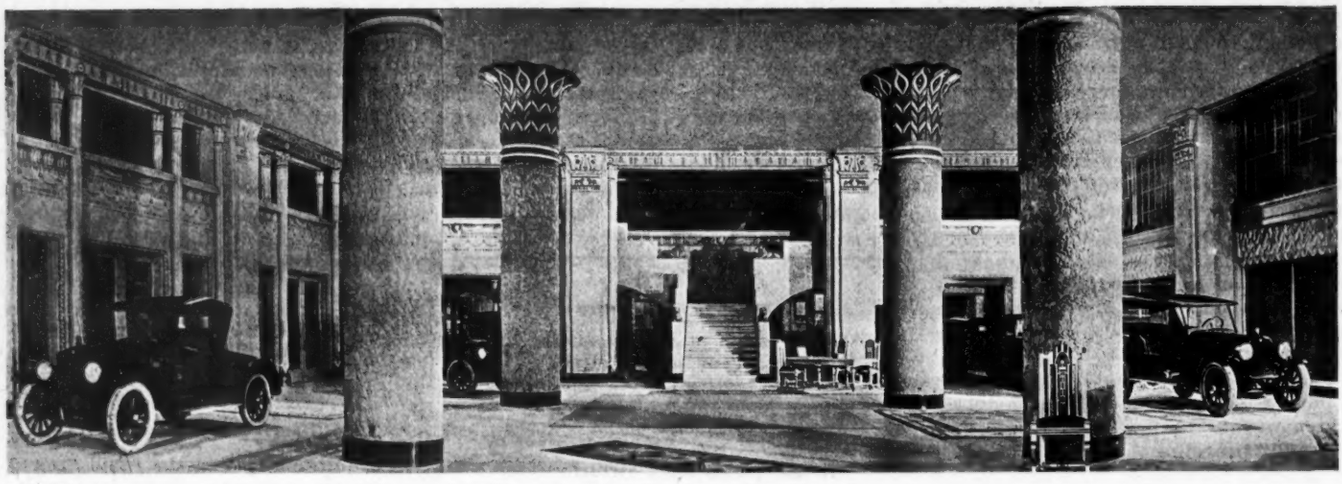
Montreal, Can., Feb. 17—Over thirty thousand sq. ft. of the total of 42,000 sq. ft. have already been taken by exhibitors who will participate in the Dominion tractor show, to be held at the Motordrome from Feb. 25 to March 4, inclusively. In every respect the 1922 exhibition promises to be one of the most successful in the history of the event in Montreal. Dealers who have entered are most enthusiastic and feel that the show is destined to prove a distinct success from their point of view.

## PEORIA TO HAVE SHOW

Peoria, Ill., Feb. 17—In lieu of the annual midwinter show of Peoria, Ill., it has been decided to make a large display of cars in connection with the National Implement and Vehicle show. It is planned to lease Machinery hall and utilize it for an exclusive exhibit of cars and accessories. This will force the exhibitors of agricultural implements to utilize tents or other buildings for their displays.

## CHARLOTTE SHOW OFF

Charlotte, N. C., Feb. 18—The Charlot Automobile Trades Assn. has definitely abandoned the idea of having an automobile show this year. Lack of a suitable building was given as the principal reason. The association went on record as endorsing the show to be held at Greensboro March 14-18 and many of the members expressed the intention to have exhibits there.



The spacious salesroom of the Harold L. Arnold Co., a company which has succeeded through a steady policy of careful service to car owners

# Applying the Department Store Idea to the Dealer's Business

## *HOW a Multitude of Little Conveniences and Services Not Ordinarily Offered by an Automobile Dealer Have Helped Build a Remarkably Successful Business*

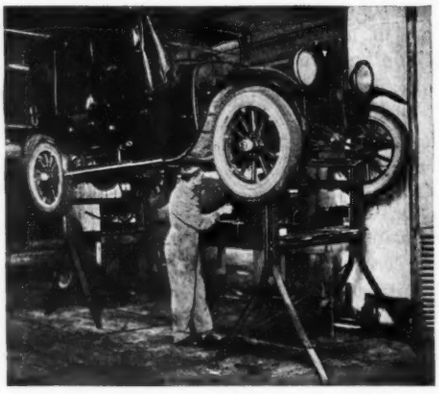
WHILE the idea of specialization in the entire retail field has developed remarkably in recent years, the department stores have apparently lost none of their lure in the eyes of American shoppers. The department store continues to be the dominating factor in the retail field and it probably will always hold this position.

Considering the remarkable response of the public to the department store appeal to "do your shopping under one roof," it seems strange that in the fast-moving progression of automobile merchandising, and in the operation of the many other branches of the automotive trades, the department store idea has not been extensively adopted in the large dealer establishments in the populous cities.

How a Los Angeles dealer was awakened to the possibilities emphasized by the "retail giants" in the downtown business sections and has adopted the department store idea, with marked success, presents an interesting study for all automobile dealers in the large cities who are doing a substantial business.

If milady prefers to go into a department store and purchase a box of hair pins at a counter on the first floor, then step across a few aisles and purchase some hosiery, take the elevator to a floor above and order some kitchenware delivered to her home, isn't it natural to suppose that the average motorist would seize the opportunity to be able to have all the wants of his car cared for by one establishment under one management, and under one roof," where by frequent contact he would gain the acquaintance of the executives and workers of the establishment and have confidence in them?

Harold L. Arnold, Hudson and Essex dealer in Los Angeles, argued this question with himself and his associates for a considerable time before he decided to make his establishment an "automobile department store." Today the Arnold organization offers a striking example of the efficient dealer establishment alive to new opportunities in the field of car selling and its allied lines.



There are no pits in the Arnold establishment. When work is to be done on the understructure of a car it is placed upon steel racks as shown above. It is much easier on the mechanics because they work in a more nearly natural position

In the large building exclusively occupied by the Arnold Co., within easy reach of the heart of the business section of the city, a motorist may purchase a car, have it thoroughly equipped with any and every accessory, purchase new tires in an exclusive tire shop, engage storage space in a public garage if he chances to live in the vicinity, have his batteries recharged or purchase new ones, have his car re-upholstered and repainted as time goes on, receive any mechanical attention promptly and efficiently, check his parcels at a convenient check room, take the elevator to the roof from which a commanding view of the city is obtained—in addition, a score and one little features of service are awaiting his pleasure.

### No Work Sent to Other Shops

Outside of requests for the construction of a special type of body, there is hardly any phase of automobile or service merchandising that the motorist cannot obtain at the establishment. Every order is filled exclusively by the Arnold organization; no work whatever is farmed out to outside shops.

Just as in the modern department store, you may find notions on the first floor, women's wear on the second, house furnishings on the third, etc., so at Arnold's you find the automobile sales room, tire shop and accessory store on the first floor, service department and machine shop on the second, battery de-

partment, upholstering and painting departments on the third floor, and so on through this structure which houses an organization that has developed the very last word in automobile and service merchandising.

Just as the leading department stores are constantly offering new ideas of service to their customers as aids to merchandising, so does the Arnold Co. spring a new appeal at regular intervals. About two weeks before Christmas Arnold threw open the space on the roof of his building, covering 1½ acres, to the Christmas shopping public, especially to the women shoppers who were invited to drive their cars up the spacious driveway leading from a street in the rear of the building direct to the roof and leave it there without charge.

A check room was maintained on the roof so the women could have their parcels delivered to the Arnold establishment from the downtown stores and call for them when they were through with their shopping.

In this connection, it should be explained that the Arnold establishment, located on the edge of the retail district of the city, is within the so-called "immediate delivery zone" laid out by the department stores. Within this zone the stores agree to make prompt delivery of parcels, while in the outlying districts the deliveries are not made until the day following the purchase. This feature proved popular with the women shoppers.

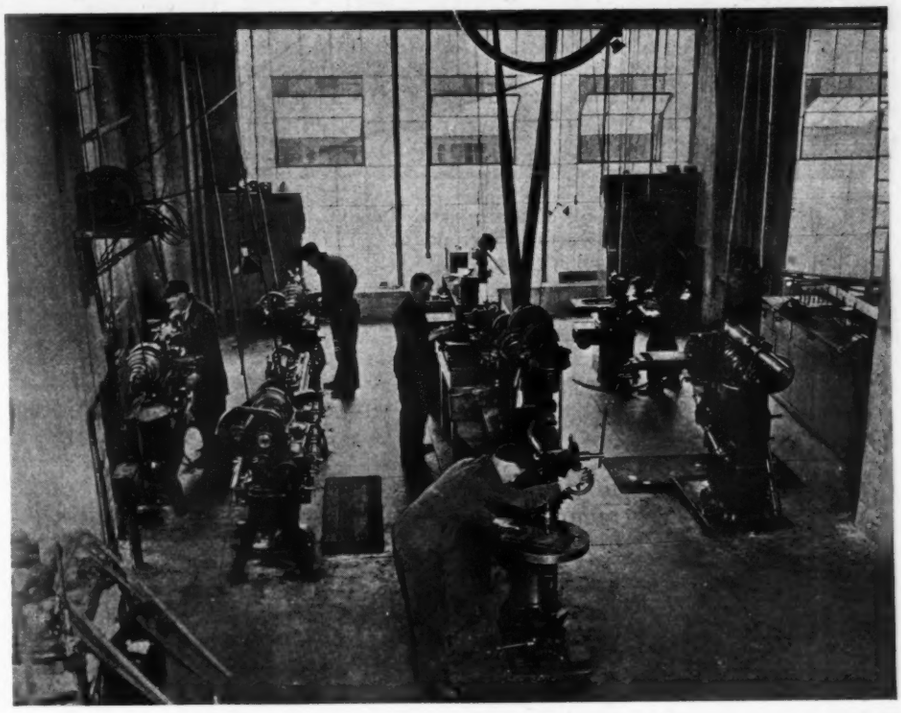
After driving their cars to the roof, the women take the elevator to the street floor and, needless to say, the course taken to the sidewalk was so laid out that they would either have to pass through the main automobile sales room, the accessory shop or the used car rooms. Returning from their shopping tours to get their cars, they would again pass through one of the departments of the Arnold "automobile department store." This contact could not help but result in new business.

**Quotes Wanamaker**

**"As John Wanamaker once said, 'Ninety per cent of the work of merchandising is getting the customers inside your institution,'" remarked Arnold. "'Selling them goods composes only 10 per cent.'"**

While every department in the six and a half acres of floor space in the Arnold building has its particular appeal to the motorist, it is those departments on the ground floor that, of course, are the features of the establishment. Particularly effective is the arrangement of the accessory shop, which, incidentally, carries one of the most attractively arranged stock of motor car accessories, both in the windows and on the shelves and counters, to be found in any accessory establishment in the west, if not in the entire country. Any person entering the adjoining sales rooms where the Essex and Hudson cars are displayed, cannot help but have his attention attracted by the displays in the accessory shop, to be seen through a spacious opening. And any person entering the accessory shop cannot help but observe the Essex and Hudson cars on display in the adjoining sales room.

The Arnold department heads or sales people, however, are not satisfied with merely encouraging the customer's gaze to be directed casually to another department. Whenever possible, the customer who enters the accessory shop through the street door leading to this department is encouraged, possibly while in conversation with the person who waited on him, to make his exit through the door leading to the street from the automobile sales floor. There are no obviously blunt attempts made to detain a customer or change his natural course, but every opportunity presented where the desired results may be obtained in a casual manner is invariably seized.



The shop is completely fitted up with modern machine tools to speed up repair work and insure accuracy. Lathes, drill presses, shapers and grinders make it possible for the shop to make practically any part needed

## *Introducing the Owner to the Accessories*

There are occasions, of course, when customers are openly invited to visit another department. For instance, after a salesman sells a new car he invariably invites the purchaser to visit the accessory shop and directs his attention to accessories, classified as "necessary," such as spotlights, motormeters, bumpers, etc., and to other accessories not classified as "necessary," but as "convenient," such as thermos bottles, dash cigarette lighters, automobile "log" books, etc.

The automobile salesman, after escorting the customer to the accessory shop, introduces him to another salesman regularly attached to this department and after the contact has been made and the latter is making progress in his negotiations for the sale of additional equipment, the car salesman may leave. Or, he may remain with the accessory salesman throughout the stay of the customer.

The point sought to be emphasized is that, under the remarkable spirit of cooperation developed in the Arnold organization by Mr. Arnold, an employee in one department invariably endeavors to promote the welfare of the other department, although each department is really an institution in itself with its own force of workers and its own executive, who is accountable only to Arnold.

Any person passing the Arnold building cannot but be attracted by the beauty or the novelty (probably one week it is beauty sought to be emphasized and the next week it is novelty) of the window displays in the accessory shop. In this connection, it is interesting to note that Arnold considers window displays that compel attention of such importance as a factor in the merchandising of accessories that he employs a skilled display man just as adept at "riveting attention" as the most expert display man in the department stores in the downtown district of Los Angeles. Not alone do the display windows of the Arnold accessory shop carry an exceptionally strong appeal and are changed regularly once each week to avoid any monotony of showing, but the arrangement of the stock inside the store is also done from the artistic viewpoint. Aside from counters and shelves on three sides of the accessory store, some lines of merchandise that are desired to be especially featured are placed on racks or small tables in the center of the room. It is en-

The Arnold company operates a battery service department and above is shown the charging racks

Rather than make its accessory and parts room a store room, the Arnold company believes in openly displaying seasonable merchandise

deavored to make these displays timely. For instance, if there is considerable news in the daily papers about accidents and an agitation has been started to lessen accidents, there are displays of bumpers, side mirrors, brake lining, etc., with appropriate signs.

## *Efficiency and Equipment in the Service Department*

The operation of the service department of the Arnold establishment offers another interesting study for efficiency. Wherever possible, labor-saving devices are found to be in use. There are no pits in the repair shop. All cars are hoisted and suspended on specially constructed car racks so that the mechanic can walk underneath any part of the car without having to stoop.

"A mechanic can do much better work in the open light standing up than he can lying down or working in a pit that is artificially lighted," explained Arnold.

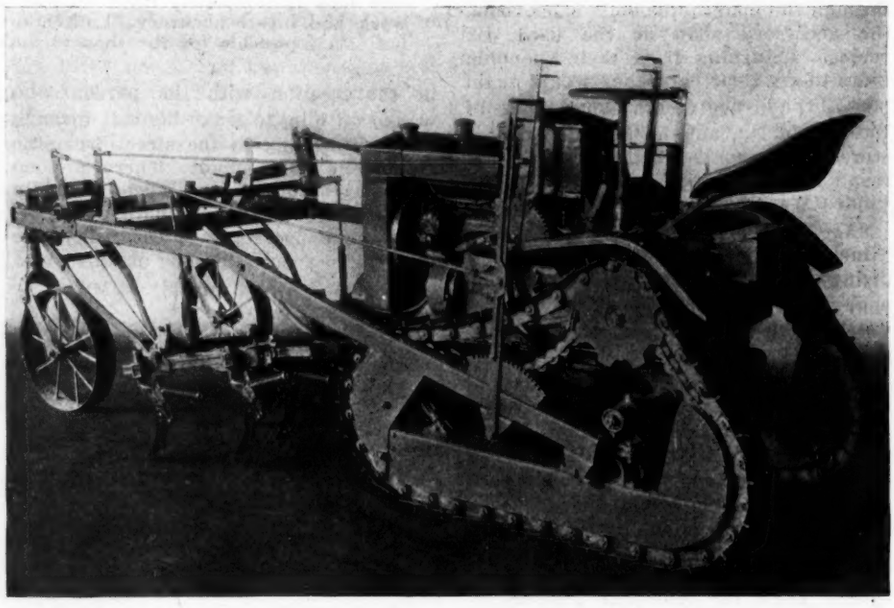
**The amount of shop work done in the Arnold shops has increased more than 500 per cent since January 1, 1921.** This great increase in shop work has been brought about in various ways and for various reasons. Possibly it is well to state the reasons first. Arnold has endeavored to build up a permanent personnel in his various departments. He wants to keep all of the members of his force through the "thick" and "thin" of business periods. To do this, there must be a sufficient volume of business to warrant this policy. It is generally known by automobile dealers that the amount of shop work fluctuates greatly and that it is often necessary to lay off several mechanics at various periods. There are no mechanics at the Arnold establishment whose employment is temporarily suspended. There is always work booked for them.

**The service department at Arnold's has its own corps of salesmen—not men who wait on the service or shop floors for car owners to come in for repairs, but men who actually go out and solicit work, just as the car salesmen do.** And these service salesmen are given the same co-operation from the house in the way of circular mail matter, etc., as the car salesmen. These service salesmen not only solicit repair work on Essex and Hudson cars, but makes of other cars as well.

On all repair jobs involving $25 or over, the car owner receives a personal letter from the service manager two weeks after the job is finished inquiring if there is any cause for dissatisfaction. Any indication that the customer is dissatisfied is the signal for a representative of the department to make a personal visit and ascertain if the customer's expectations had not been fulfilled.

"You will find in every department of this establishment a splendid spirit of co-operation," said Arnold. "Each department is ever on the lookout to send along some business to another department in our 'automobile department store'. From 15 to 20 sales of new cars are developed by employees in our service department every month.

"I am thoroughly convinced that dealers in the large cities will swing more and more to applying the department store idea to their establishments. Its possibilities are too great to be overlooked very long."



## Cletrac Straddle Row Cultivator

CLETRAC has added to its line a cultivator, which is in reality more than a cultivator for the universal frame which attaches to the Cletrac "F" exactly as it does the two-row cultivator, is used as a frame for planters, weeders, listers, special harrows and cultivators alike. The spread of the gangs and the distance between the two sets of gangs can be varied from the operator's seat.

# How Arnold Lets His Customers Know About His Service Facilities

## Submitted in Evidence

Court of Competent Judges | Case of "Skill vs. Neglect" | S.S.

Home of Hudson and Essex Motor Cars, Arnold Building, Corner Seventh and Figueroa. Mechanical Department Entrance Orange St.

### Preparing *for* Cylinder Head Removal—

Showing the use of special speed wrench in removing cylinder head from block. The use of this tool prevents the breaking of spark-plug porcelains which sometimes will occur when using an ordinary wrench.

Many other Arnold appliances have been developed to save time and cost to Hudson and Essex owners.

In this picture notice front fenders protected from damage by suitable covers saving the marring of enamel finish. An illustration of attention to our owner's interest. Bring *your* car in today.

Daylight Shops—Adequate Machinery—Expert Mechanics

**Other Departments of Interest to You**

*Storage Battery Department.* Testing your battery involves no obligation. It is safer to know than to guess.

*The Painting Department* has experts to care for your needs. Paint and Varnish save many dollars' depreciation.

*The Trim Department* will dress your car up wonderfully—put on a new top—new back curtains—steel covers, etc.

*An Accessory Store* featuring Quality Motor Goods, Standard Accessories, and Auto Camp Equipment.

*Park your car in our Garage*—ten cents for two hours—convenient—comfortable—fireproof.

Harold L. Arnold

Hudson and Essex Distributor
Seventh and Figueroa, Los Angeles

## Your Car has Earned it's Right

Home of Hudson and Essex Motor Cars, Arnold Building, Corner Seventh and Figueroa. Mechanical Department, Paint, Trim, Battery, and Parts Service, Entrance Orange Street

### Universal Valve Grinder—

Genuine Tungsten Exhaust Valves as used in Hudson and Essex are very hard. To insure best results we have a Universal Grinder. This machine will grind the valves to a perfect 45 degree angle.

Another example of Arnold method of securing the best for Hudson and Essex owners.

Daylight Shops—Adequate Machinery—Expert Mechanics

Give Your Car the Benefit

**Other Departments of Interest to You**

*Storage Battery Department.* Testing your battery involves no obligation. It is safer to know than to guess.

*The Painting Department* has experts to care for your needs. Paint and Varnish save many dollars' depreciation.

*The Trim Department* will dress your car up wonderfully—put on a new top—new back curtains—steel covers, etc.

*An Accessory Store* featuring Quality Motor Goods, Standard Accessories, and Auto Camp Equipment.

*Park your car in our Garage*—ten cents for two hours—convenient—comfortable—fireproof.

Harold L. Arnold

Hudson and Essex Distributor
Seventh, Figueroa and Orange Sts.,
Los Angeles

## Cost is not Cash Alone

Home of Hudson and Essex Motor Cars, Arnold Building, Corner Seventh and Figueroa. Mechanical Department, Paint, Trim, Battery, and Parts Service, Entrance Orange Street

### Reaming Valve Seat—

You own a Hudson or Essex. Then this illustration will interest you.

It shows the Arnold method of reaming a valve to a perfect 45 degree angle in the cylinder block by the use of a special valve reamer.

To get the full power from your motor the valve seats must be perfect before being ground in with valve grinding compound. Valves carelessly ground in will later develop trouble, and motor will miss, due to valve leakage. As heat warps metal, valves that have been in operation for some time cannot be true. Machining them with the proper tool saves time and money besides insuring maximum power from your motor. *Don't blame your car.*

Special Tools—Skilled Help—Accurate Results

**Other Departments of Interest to You**

*Storage Battery Department.* Testing your battery involves no obligation. It is safer to know than to guess.

*The Painting Department* has experts to care for your needs. Paint and Varnish save many dollars' depreciation.

*The Trim Department* will dress your car up wonderfully—put on a new top—new back curtains—steel covers, etc.

*An Accessory Store* featuring Quality Motor Goods, Standard Accessories, and Auto Camp Equipment.

*Park your car in our Garage*—ten cents for two hours—convenient—comfortable—fireproof.

Harold L. Arnold

Hudson and Essex Distributor
Seventh, Figueroa and Orange Sts.,
Los Angeles

## Are You Out at the Knees?

Home of Hudson and Essex Motor Car, Arnold Building, Corner Seventh and Figueroa. Mechanical Department, Paint, Trim, Battery, and Parts Service, Entrance Orange Street

### Of Course Not!

### *Then Why Your Motor Car?*

The cost is negligible in comparison with the improvement—even if your feelings only were considered.

Now is the time to bring in your car—no matter what the make, size or color.

**Other Departments**

*Storage Battery Department.* Testing your battery involves no obligation. It is safer to know than to guess.

*The Painting Department* has experts to care for your need. Paint and Varnish save many dollars' depreciation.

*An Accessory Store* featuring Quality Motor Goods, Standard Accessories, and Auto Camp Equipment.

*Park your car in our Garage*—ten cents for two hours—convenient—comfortable—fireproof.

Harold L. Arnold

Seventh, Figueroa and Orange Sts.,
Los Angeles

ONE of the surest ways to sell customers on the fact that your service station is tooled up properly to give the right kind of service is to advertise the fact. Here are shown four advertisements sent out by Harold L. Arnold to remind owners of cars he sells that his service station has the necessary equipment and methods to render efficient service. These circulars are mailed and take up various phases in connection with the engine or car

# Atlanta Dealers' Show Tones Up Southern Automotive Business

## SALES Greater Than Had Been Expected—Price Held a Minor Note with Quality and Utility Emphasized—Bankers in Cooperative Ad Express Confidence in Local Dealers

FOR a long time business in the southern territory has needed a tonic that would work a sort of miracle, comparable, as it were, to the rejuvenative powers of the fabled "Fountain of Youth."

The second great southern automobile show, which opened at the Atlanta auditorium Saturday, Feb. 11, continuing through the week to Saturday, Feb. 18, provided the exact tonic that the industry has been in quest of, and the public partook of it in very good measure.

There was nothing whatever of the holiday idea about the 1922 event that has been the ruling feature of past shows in this section—it was designated for the one and only purpose of bringing business back to normal, or at least taking a step in that direction; in other words, of making the people buy.

And it accomplished that result to an even greater degree than the most optimistic dealers had anticipated.

In fact, as previously stated, it was precisely the sort of a tonic that the industry has long needed in this section, and business has undoubtedly entered the stage of recuperation as a result of it.

**Dealers in Atlanta are not over-optimistic, as was the case at this time a year ago, but they are unanimous in their belief that the show proved the turning point to better conditions and that a fair volume of business is in prospect for the remainder of the year.**

### *Soft Pedal on Price by Salesmen*

While recent price cuts had some effect on the prospective buyers of cars, it was not nearly as noticeable as the majority of dealers had expected it would be. For the past few months sales in Atlanta have suffered because the public naturally has been expecting further reductions, and was adverse to buying until prices had reached a more stable basis.

It was the natural belief therefore that this would have its effect on sales during the show, **but, as the salesmen and dealers had been coached to forget all about price cuts and devote their attention to selling automobiles, the matter was successfully shoved aside.**

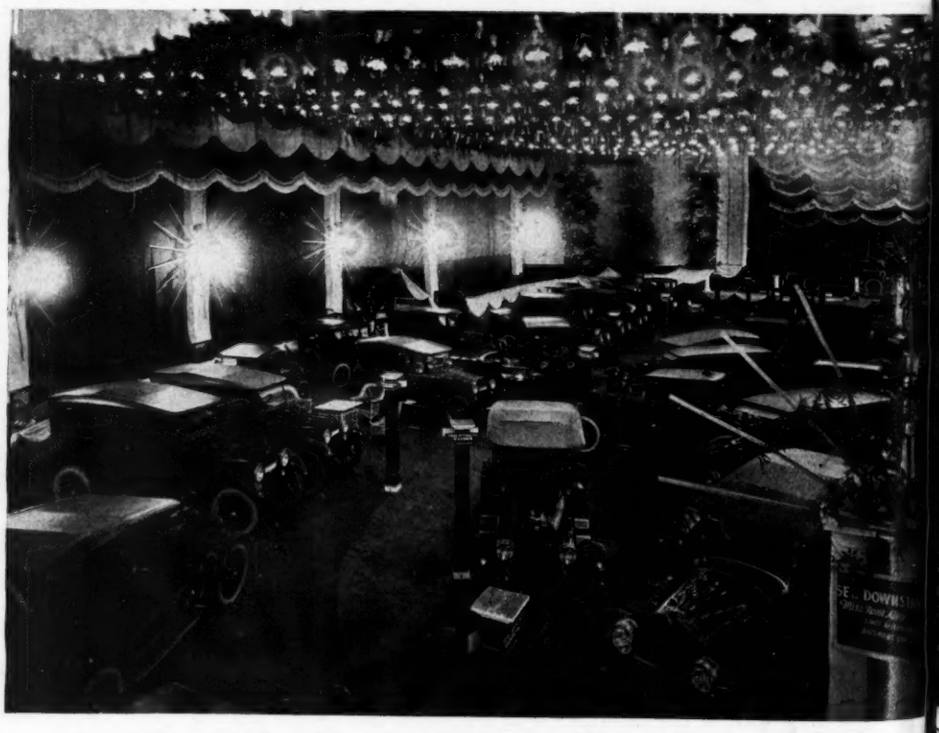
The public had confidence in an industry that would invest more than $75,000 to stage such an event, and in an industry paid so glowing a tribute as it was tendered in the co-operative advertisement of the leading Atlanta banks, and because the public had confidence, price cuts of the past few months did not serve to seriously retard sales.

While a great many sales were made during the show—considerably more, in fact, than were made at the 1921 event—the big feature was in the large number of prospective buyers that were found. A large part of these prospective buyers will be in the market during the coming year, and there are many who can be influenced to buy at an earlier date than they had expected, by concerted effort on the part of the dealers and their sales organizations. And they are prospects that never could have been discovered were it not for the automobile show, which had the effect of stimulating their interest.

This year's Atlanta show was undoubtedly a sectional event, serving a large area in the south in which are located approximately 3500 dealers. All other shows in the southern field are more or less local. There was a far greater interest this year on the part of the manufacturers of motor cars, trucks and equipment than was displayed last year, and not a few of the factories had representatives in attendance during the week. Among these were the Paige-Detroit, Lincoln, Moline Plow Co., Auburn, Gardner and Marmon.

### *Advertising Campaign Brings Large Crowd*

One factor that contributed much to the success of the 1922 event here was the concerted publicity campaign that was carried on by the committee in charge of that work, and under the personal direction of Benjamin F. Ulmer, assist-



View of the Great Southern Automobile Show held in Atlanta

ant manager of the Southern Buick branch in Atlanta.

Approximately $7500 was invested for this purpose, including paid advertising space in all important newspapers of the southern field, window display cards and billboards, and personal letters with a follow-up campaign by direct mail to the 3,500 dealers in the territory, and to every manufacturer of motor cars, trucks and equipment in the United States. Complimentary tickets to the show were sent all dealers and manufacturers.

No more extensive and concerted publicity campaign was ever before conducted in the south over the same period of time, and, as a result, the Atlanta show proved to be the biggest event of its nature the south has yet witnessed.

Next year the Great Southern Automobile Show will be recognized as a national show by the National Automobile Chamber of Commerce, due to the fact that it serves a sectional territory which obviously cannot be served by the New York and Chicago shows. Southern dealers feel that their section is now deserving of, and ripe for a show of national importance in that the Atlanta event covers 284 cities and towns in all southern states, and approximately 3500 dealers.

### *Estimate Dealer Attendance Double Last Year's Total*

Probably more than twice as many dealers from the southern territory were present than in 1921, many coming to Atlanta Saturday, Feb. 11, and remaining for the show during most of the following week. There were a number of successful meetings of distributor and dealer organizations, at all of which optimism over the outlook was the prevailing feature. The tendency at this year's dealer meetings, however, was to get down to work and map out definite sales and merchandising campaigns for the future, and to make those campaigns succeed by hard work and personal effort.

The show was held under the auspices of the Atlanta Automobile Association, which includes in its membership about 90 per cent of the motor car and truck dealers and distributors in this city, and a large majority of the equipment dealers and jobbers. It was under the personal management of Virgil W. Sheppard, to whom a great part of the credit is due for its unusual success. The auditorium was attractively decorated for the event, and the pleasure car, truck and accessory exhibits very well arranged.

It was strictly a "business display," however, and, while the effort was made to beautify the scene as a whole, the individual exhibitors confined themselves entirely to the work in hand and arranged their displays with the idea in mind of interesting the public in the matter of buying.

It is estimated that the total cost of the show amounted to something over $75,000, and one of the features of the event was the laying of this fact before the public. The effect of it was entirely favorable and the public showed it by visiting the auditorium to a greater extent than was the case in 1921, for attendance figures every day were in excess of the 1921 show. People have confidence in any industry that shows it has confidence enough in itself to invest almost a hundred thousand dollars for the sole purpose of exhibiting its wares to prospective buyers.

There were about 85 separate exhibitors at this year's Atlanta show. Of these 35 were of accessories and automotive equipment, 35 passenger car exhibits and 15 truck exhibits. Something over 20,000 sq. ft. was taken up by the passenger and touring cars, 10,000 by accessories and equipment and 10,000 by trucks. About 200 different types of passenger cars were shown, several of which were seen for the first time in the south, and all attracted widespread interest.

### *Bankers Express Confidence in Dealers Through Ads*

Perhaps nothing in connection with the show attracted a greater interest on the part of the dealers, or helped to restore public confidence to a greater extent, than full page advertisements published in Atlanta newspapers of Sunday, Feb. 12, by seven of the largest banks in the city—banks, in fact, that are among the largest and best known in the south. The advertisement was of a co-operative nature, with the names of the seven banks signed thereto. It was headed:

**"Congratulations to the Motor Car Dealers of Atlanta and the Southeast on Their Second Great Southern Automobile Show."**

In the body of the advertisement a very high tribute was paid to the automotive industry as a whole, and to the dealers of Atlanta. There were also twelve separate paragraphs in the advertisement briefly setting forth twelve tangible reasons why the motor vehicle is indispensable to the public and industrial welfare of the nation, and expressing the absolute confidence of every one of these banks in the industry itself and the men connected with it. The following banks participated: Atlanta National, Lowry National, Fourth National, Citizens & Southern, Central Bank and Trust Corp., Fulton National and Atlanta Trust Co.

Entertainment features during the Atlanta show included a morning, afternoon and evening concert each day by Major's band in the main auditorium, and a jazz orchestra in the truck division in the basement.

In the interest of better roads in the south, an exhibit was conducted jointly by the Georgia State Highway Commission and the Atlanta Automobile Assn., the public displaying a considerable interest in this exhibition.

eb. 11 to 18. This Event Serves a Large Section of the South

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**I. H. C. BRANCH CONVENTION**

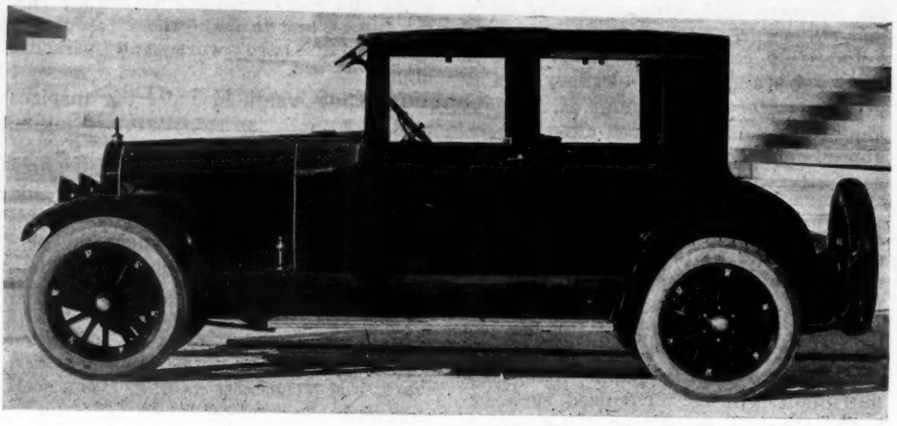
Davenport, Iowa, Feb. 17—Seventy implement dealers from Scott and adjoining counties were guests recently of the Davenport branch of the International Harvester Co. Factory representatives gave sales talks and survey of the business outlook was undertaken.

# Recent Automotive Developments of Various Characters

## Cole Adds Coupe Brougham

THE Cole Motor Car Co. announces the addition of a new body design to its line of all-season equipages.

The new car known as a Coupe Brougham, is painted a deep maroon with black metal parts and upper body panels. It seats five passengers. The rear seat is solid, giving ample room for two passengers. The front seats are mounted on individual bases. The right seat tilts forward, giving access to rear seats. The spacious clear vision windows, door locking features, cowl ventilator, reardeck luggage compartment and wide doors make this model distinctive.



New Cole Coupe Brougham seating 5 passengers

## New Splitdorf Magnetos in Two Types

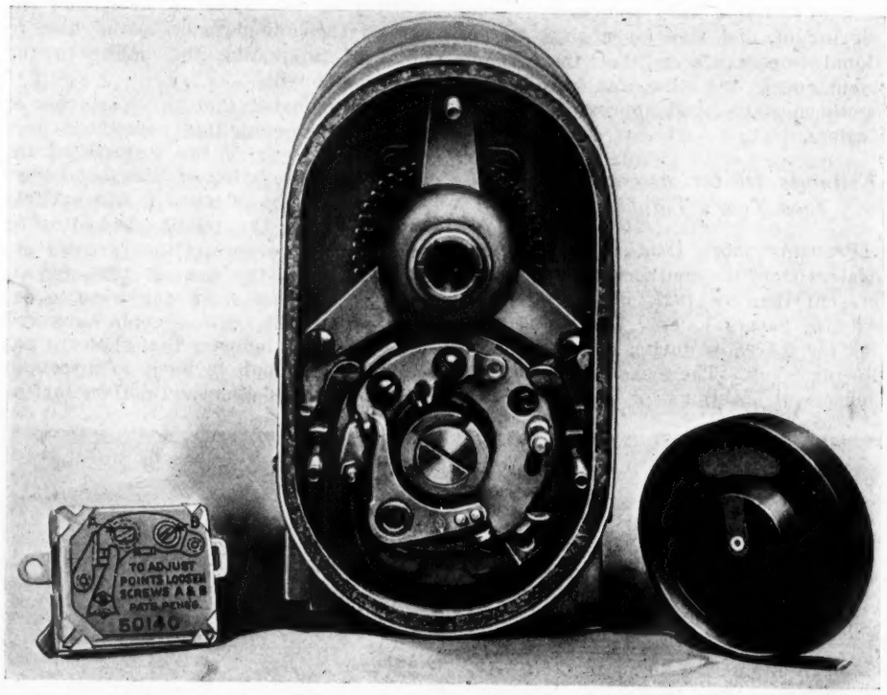
THE new series of Splitdorf magnetos show a big advance in the inductor type of high tension magneto. To obtain a greater electrical output has been the aim in the development of this new series. The new magneto is at present made in two sizes, the smaller one known as Model S and the larger one known as Model SS. The model S is being manufactured in 1, 2, 3, 4, and 6 cylinder types.

The model SS magneto is similar in construction to the smaller size and is particularly adaptable to larger engines or where a spark of greater volume is required. Model SS is adaptable to two spark ignition. It is manufactured for engines of from one to twelve cylinders, inclusive.

The model S in advance position produces sparks regularly over .020-in. spark gap under 60 lbs. compression at 40 r. p. m. and under 100 lbs. compression at 90 r. p. m. Model SS under the same conditions sparks under 60 lbs. compression at 30 r. p. m. and under 100 lbs. compression at 50 r. p. m.

In this new Splitdorf series the model S has a single permanent magnet, while in the model SS two magnets are used. The magnet or magnets are arranged with the planes transverse to the rotor axis. The effective cross-section of the magnets is the same from end to end.

The design of the rotor is particularly interesting. A through steel shaft supported on ball-bearings is used. The rotating laminations are effectively fastened to the shaft by reason of being anchored in non-magnetic material which is cast under pressure around the shaft and laminations. There are several advantages in this construction, a solid shaft naturally makes a more rigid construction than one built up of several parts. The shaft is not magnetized and some magnetic leakage is therefore eliminated.




New Splitdorf model "S" high tension magneto with cover, condenser and distributer-block removed; note accessibility of contact point adjustment and instructions for same printed on face of condenser

## Pistons, Rings and Pin Specifications

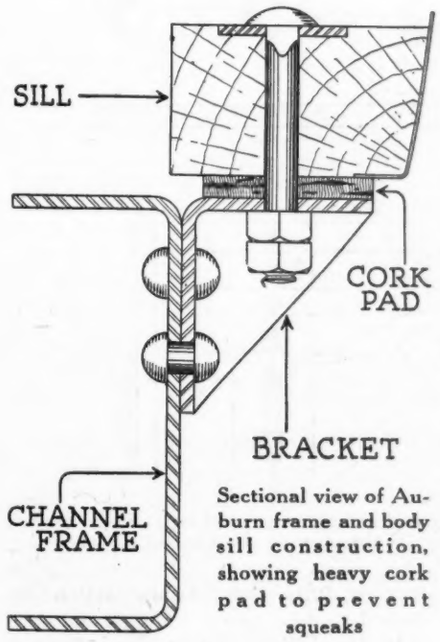
A BOOK of value to service men, repairmen, cylinder regrinders, etc., has been issued by the Waterhouse Welding Co, Boston, Mass. Besides taking up a general discussion of pistons, both iron and alloy types, the book mentions those things for which the repairman must watch when reassembling an engine the cylinders of which have been reground.

Much of the book is devoted to data sheets giving piston, pin and ring specifications for passenger cars, motor trucks, motorcycles and engines in general. Table V gives a complete list, arranged consecutively, by diameters, of diameters, models and stock numbers of all pistons included in the first four tables. This table is of use in identifying any unknown or doubtful piston.

Besides listing the name and model of all cars, trucks, etc., the book gives the following information regarding each vehicle: number of cylinders, diameter, piston length, compression distance, distance between bosses, set screw diameter and thread, pin hole diameter, pin length, type of pin, sizes of grooves, prices, etc.

## Preventing Body Squeaks

ONE of the features of the new Auburn is the method of mounting the body on the car frame which is said to do away with any chances for body squeaks. In the assembly of the body and frame no metal touches metal, in fact, the body is not attached directly to the frame. The illustration shows how the mounting is accomplished. Attached to the channel frame are a series of brackets and to these brackets the body sill is bolted. Between each bracket and the sill is a cork pad, which insulates body and sill and therefore, does not present hard surfaces which are likely to rub against one another and cause squeaks. From the illustration it also will be seen that the bolt used for mounting the body has a square shoulder under the head which fits into a large washer having a square hole in it. This prevents the bolt from turning in the wood when it is desired to remove the nuts.




Sectional view of Auburn frame and body sill construction, showing heavy cork pad to prevent squeaks

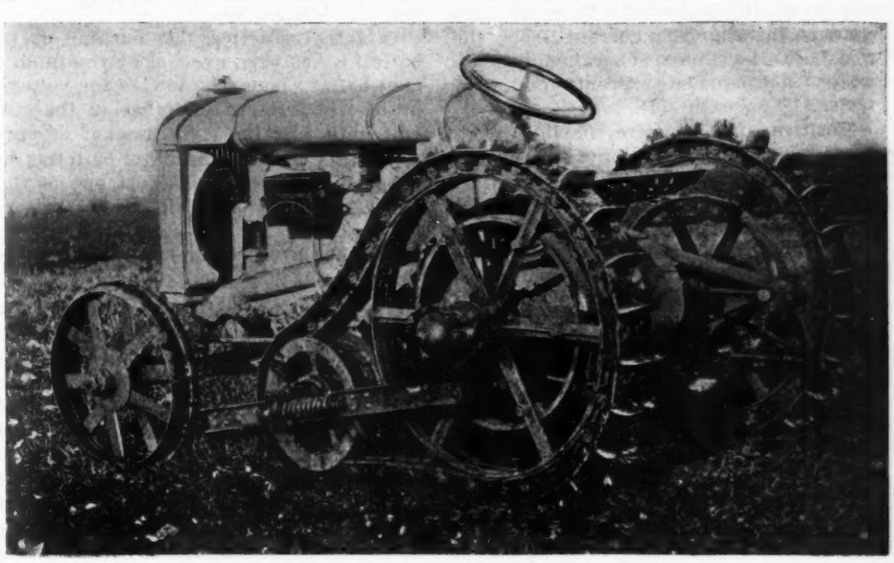
## Crawler Attachment for Fordson Tractor

A STEEL crawler drive for the Fordson tractor has been brought out by the Bates Machine & Tractor Co., which is of the same general construction as the crawlers on the Bates Steel Mule. It can be put on in the field in about an hour's time, as it is not necessary to drill a single hole or alter the tractor in any way. It is stated that the draw bar pull of the tractor is increased very much, due to the grip of the crawler traction on the ground. The price of the attachment is $295. It is stated that the tractor with the crawler attachment is able to pull three 14-in. plows, whereas only two are possible with the wheeled type.

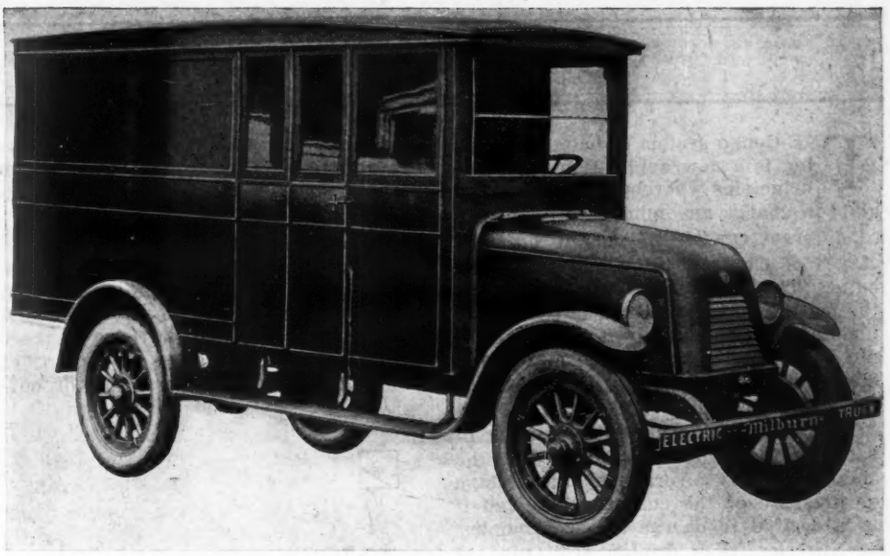
The crawlers are 8 ins. wide and have grousers 1½ ins. high, made integral with the shoes which are open hearth steel. The shoes are connected with a hardened steel pin which works in a hardened steel bushing. On the outside of the bushing is a hardened steel roller which takes the pull of the drive sprockets and eliminates friction and wear. The sprockets are of alloy steel with openings between the teeth which permit the dirt to fall through, and is a patented construction of the Bates Steel Mule.

These sprockets are mounted directly on the rear axle shaft. The front idler crawler wheels are the same as the Bates Steel Mule and are carried on Hyatt bearings, entirely inclosed from the dust. The tension of the crawlers is taken up by coil springs which are adjustable. To get the same pressure on the front end of the crawlers as on the rear, a semi-elliptical spring is attached to the front crawler frames and the under part of the tractor. This spring is riveted in the center which permits the crawlers to oscillate entirely independently of each other and at the same time get an equal pressure at all points.

The tractor is fitted with two crawler turning devices, each having an independent foot lever so that either crawler can be slowed down or stopped entirely for short turning, with the result that an inside turning circle of 2 ft. is obtained. This makes possible very short turns when working on soft ground in and around orchard trees.



Bates crawler attachment for Fordson tractor



## Milburn Adds Two New Units to Line

THE Milburn Wagon Co., Toledo, announce the addition of two new truck units to its line, which formerly consisted of a brougham, a coupe, a roadster and a 750-lb. delivery truck.

It is said the new Milburn trucks incorporate many radical changes in design. New and improved features, many of which are exclusive, have been added with the direct purpose of making these trucks particularly suitable to the continuous grind of hard commercial service required in business deliveries.

# Constant Potential System of Battery Charging

THE Conpo system of battery charging is a new application of known principles whereby it becomes possible to charge any number of batteries of different capacities and in different stages of charge with equally good results. The charging is carried on and the batteries are connected in the charging line by what is known as the multiple or parallel system. The more common methods of charging batteries use the series system.

With the series system, the number of batteries that must be connected in the single series is governed by the voltage or pressure of the charging line and if it is desired to charge a lesser number of batteries, then foreign resistance of some sort must be placed in the line equivalent to the resistance of that number of batteries which have been omitted from the series.

The Conpo apparatus, essentially consists of a motor, a generator and an exciter, which are mounted on a single base. In addition there is a panel board, charging bench and the necessary control switches.

The motor, 2 to 20 h.p., is built for single, two, or three phase operation at 220 volts, 60 cycles, in the standard equipment.

The generator, 1 to 12 k.w., is of the 4-pole, 3 wire type, shunt wound and direct connected to the motor. Normal voltages from the windings are 20 and the exciter is of the 125-volt type with a wattage capacity suited to the respective generator it accompanies. The exciter is mounted on the common shaft and with generator field rheostat and balancing transformer, completes the machine assembly.

The main panel board carries two ammeters, one for each circuit, and a voltmeter. The field rheostat is also carried here, where line voltage and total load may be readily inspected. Main bus bars conduct the charging current from the panel to the Conpo charging benches which accommodate twenty-four batteries, 12 on each side.

Positive and negative flexible cable leads are carried down from this mounting to the battery position and these are provided with suitable clips for attaching to the battery terminals.

Batteries are built in various sizes from the motorcycle battery of three cells and three tiny plates to each cell, on up to the very heavy truck type batteries containing as high as 25 plates. These larger batteries require a great deal more current for charging than the small ones and this is true in almost direct proportion to the total amount of plate surface within the cells.

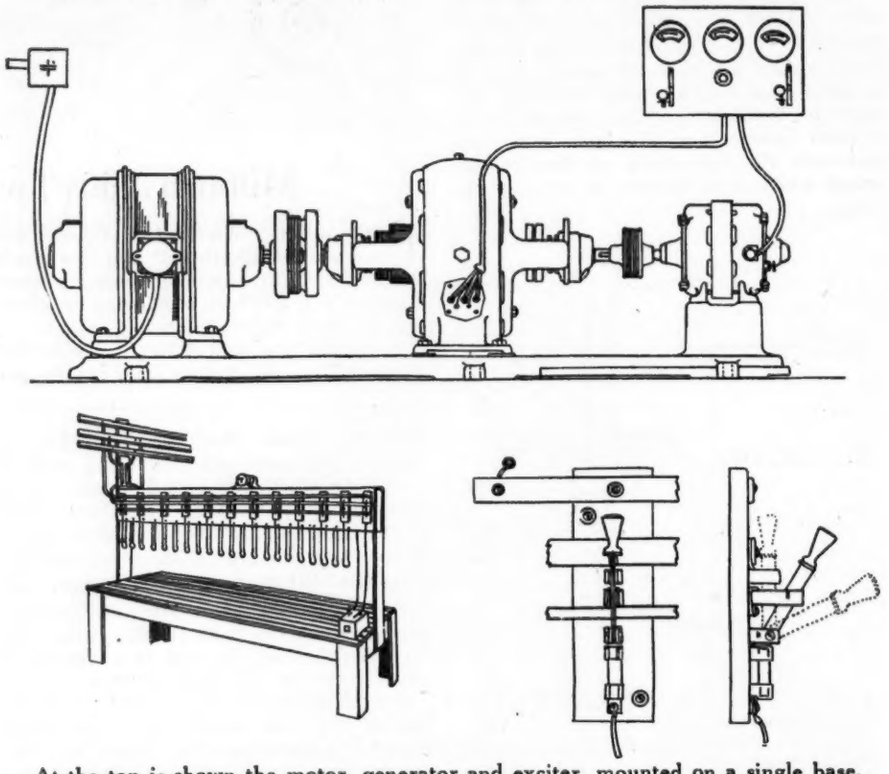
Batteries are designed to operate at voltages of approximately 6 and 12, and their internal resistance is so measured that when currents of these respective voltages are passed through them, they in turn are self-protecting and the charging function is performed upon them without danger of an undue flow of current.

Ten batteries are connected in series, this series in turn is connected to a charging line having a voltage, roughly, ten times the voltage of the individual battery. Suppose two or three of these batteries are of the large 19-plate type. There is then too great a flow of current through the smaller batteries and they are burned up.

In actual practice, this burning up of batteries has been avoided by the intelligent battery man who lowers the voltage or inserts foreign resistance in the circuit until just the right amount of current flows through these ten batteries to properly charge the smallest one of the lot. This means that all the big batteries in the series are being delayed because they are getting just a fraction of the current they need.

Also when ten batteries of exactly the same size are placed in this "series" line, unless they are all in identically the same state of charge or discharge, they are just like a string of different sized batteries. One that is fully discharged has very little resistance and will pass a great flow of current. The ones that are almost charged have high internal resistance and will pass very little current without overheating.

It is claimed also that the method never overcharges the battery or causes excess gassing because the battery's own state of discharge forms an automatic and positive, self-protecting and self-governing part of the system. The rising voltage of the battery, as charging progresses, forms the effectual shut-off on the charging current. When the battery voltage and charging voltage approach close to each other, all charging action ceases. A slight movement of the control switch shows at a glance when the battery is fully charged and action has ceased.



At the top is shown the motor, generator and exciter, mounted on a single base. A charging bench is shown at the left. Right, one of the control switches

In the Conpo system the battery is charged with a current having a voltage that harmonizes with the inherent voltage of the battery. Also each battery is heated as a separate individual, irrespective of every other battery being charged on the system.

By means of the Conpo control switch and the ammeter mounted on each panel, a battery may be placed at any vacant position on a bench and the following determinations made at a glance:

Relative state of charge or discharge.

Internal short circuit (dead cell).

Open circuit or broken terminal.

Records taken from battery stations equipped with this method of charging indicate a reduction of 66 per cent in charging labor and a reduction of 55 per cent in current consumption. The equipment is made by the Constant Potential System, Fort Worth, Tex. Installation is supervised by the company's engineers.

# Trade Outlook Encouraging at Kansas City Show

## *Rising Corn and Livestock Prices Have Started the Farmers to Sending Produce to Market—Debts Being Liquidated and Money Situation Easier*

Kansas City, Mo., Feb. 18.

THE annual automobile show, which was held here this week, was typical of this metropolis of the Southwest—colorful, cheerful, with hospitality the ruling influence throughout the exhibits. Rolls-Royce was shown here for the first time, attracting much attention, as did the showings of all the entirely new 1922 cars. Public and trade also warmly welcomed the many factory executives, including several presidents and general managers, who came here for the show and the week's meetings and as in cities farther east, Captain Rickenbacker and his new car were a center of interest.

The salesmen did an exceptionally good job with the show. In fact, it was, in a large measure, the salesmen's own show. The dealers here followed the Chicago plan of training the men to tell an identical story of conditions in the industry and held a night-before-the-opening-day meeting, as Chicago did, to "take off" into the show work, but they made it even more of a salesmen's affair than in Chicago.

The meeting was managed by a committee of salesmen, presided over by a salesman and salesmen had an active part in the proceedings, actually informing themselves and enthusing themselves for the week's work.

More than 500 salesmen attended the meeting, which was an evening luncheon, with an after-luncheon program.

### *This Territory Shows Marked Signs of Improvement*

Last year the dealer attendance at the show was discouraging but there has been a large out-of-town representation from the trade at this show. Despite the fact that dealer organization lists are smaller than they were a year ago, registrations for dealers' dinners and for the central trade dinner conducted by the Kansas City Motor Car Dealers' Association were far larger than they were a year ago. And these outside men, seeing sales made at the show, seeing some of their own townspeople there and reading in the newspapers the reports of rising grain and live stock prices, have taken new heart and have gone back home to begin doing business.

Throughout the week practically all the big branches and distributor organizations had dealer meetings and Wednesday noon was the trade rally of the dealers' association, attended by more than 500 heads of organizations from the city and territory—comprising western Missouri, Kansas and Arkansas—George M. Graham, vice-president of the Chandler Motor Car Co., and Ray W. Sherman, merchandising director of the Automotive Equipment Association, were the principal speakers, with Estel Scott, president of the dealers' association, presiding, and Secretary Peake acting as toastmaster.

The meeting brought to the attention of the trade some of the sales possibilities of the year, which are becoming more and more apparent as spring approaches.

The almost universal discouragement in the small towns, which prevailed throughout 1921, is disappearing. Bankers, merchants, farmers, all classes of business employing people, suffered from prevailing conditions, and it was not surprising that automobile dealers absorbed the prevailing spirit and, in some cases, failed even to sell cars that might have been sold. But throughout the past 60 days there has been in progress a remarkable liquidation of debts, due to rising corn and livestock prices which have induced farmers to move goods to market.

### *Money Has Started to Move—1922 Outlook Reassuring*

The movement is still in progress, with hogs and lambs particularly commanding what are now regarded as high figures. The produce, of all classes, is moving east and west and money in payment for it is flowing back into this entire northwestern, middle western and southwestern territory, putting spending money in some people's pockets, enabling others to begin lifting indebtedness and generally easing the money situation.

This entire grain and livestock country feels much better than it did a year ago. The show proved it, the talk in the streets corroborates it and business men in all fields and particularly the automobile men, are going into 1922 not only detemined, but reasonably assured of doing more business and surely more profitable business than in 1921.

## Aids to Starting

(From Automotive Industries, Jan. 19)

MUCH remains to be done in the way of making cars easier to start in cold weather. More attention was given to this factor when hand cranking was the rule, but it has in general been overlooked or given inadequate consideration on the majority of modern cars fitted with electrical starters. As a result there is a great burden placed upon the battery and much trouble resulting from the effect of fuel which passes the pistons and dilutes the lubricating oil.

Experiments recently carried out by one manufacturer who was seeking to remedy troubles of this kind are reported to have shown that thirty seconds of cranking with the carburetor strangle closed resulted in a half pint of fuel flowing by the pistons into the crankcase. Four cranking periods of this length per day would thus result not only in wasting a quart of fuel, but in serious dilution of the lubricating oil with its consequent difficulties. This may be an exceptional case, but it is indicative of a very prevalent trouble which may be less or greater in degree in other cases.

A large percentage of all cars are kept in unheated garages or are allowed to stand out of doors for long periods during which the engine becomes cold, and even in warm weather there is frequent difficulty in starting, for the initial boiling point or the proportion of light ends in the fuel is usually less in warm weather. Consequently the problem of obtaining a quicker start as well as that of so controlling the cooling system as to bring the engine up to a good operating temperature quickly is worthy of careful study.

The heat necessary for actual vaporization of the fuel needed in starting is sometimes obtained by the use of an electric heating element and sometimes by burning a small amount of fuel. Primers using fuel which is easily vaporized at quite low temperatures have also been employed with satisfaction in some instances. Probably all devices or systems used to aid in starting have certain drawbacks as well as certain advantages, but the need for a simple, dependable and inexpensive device for this purpose is becoming increasingly evident and seems likely to become more necessary than ever as motor fuel is made less and less volatile.

# Proper Valve Adjustment Essential to Smooth Engine Operation

## *EXPANSION of Parts Like Cylinder Block, Valve Stems, Etc., Factors to Be Considered. New Engines Generally Have More Clearance Until Valves Become Seated*

By C. C. CALLAHAN

*Sales Manager, The Parts Service Co.* *(Copyright by the Parts Service Co.)*

THE adjustment of valve tappets, particularly on those cars equipped with overhead valves, looks so easy that it is a constant temptation for tinkering, even though the tinkerer may not have a thorough understanding of all the conditions affecting proper valve and tappet adjustment. In order to clear up some of the less widely known conditions, and to bring out each item as a separate factor, the subject has been dealt with in the form of a questionnaire.

*Q. Why are valve tappets adjusted with a clearance between the adjusting screw or rocker arm and the end of the valve stem?*

Ans. Clearance is necessary between the valve stem and the rocker arm or adjusting screw so that when the cam rotates to the position where the valve is supposed to be closed, it is actually closed firmly and tightly by the valve spring.

*Q. What should be the condition of the engine when clearance adjustments are made?*

Ans. It should be warmed up to normal running conditions of temperature.

*Q. Why should this precaution in regard to temperature be taken?*

Ans. Because if adjustment is made when the engine is cold, the clearance usually will be something entirely different when it is hot. That is, the clearance may be too great or too little, or entirely eliminated, depending on engine design and whether the valves are in the head or on the side.

*Q. What is the effect of too great a clearance?*

Ans. The engine becomes noisy, that is, a "click" can be heard when the tappet screw or rocker arm hits the end of the stem, and the end of the valve stem is subjected to excessive wear and battering, due to the fact that the tappet face or roller has moved for some distance up on the steep part of the cam and thus the whole tappet is traveling at a much greater velocity at the time that the adjusting screw comes in contact with the end of the stem than it would be if the clearance were smaller and the tappet just starting on the steep part of the cam.

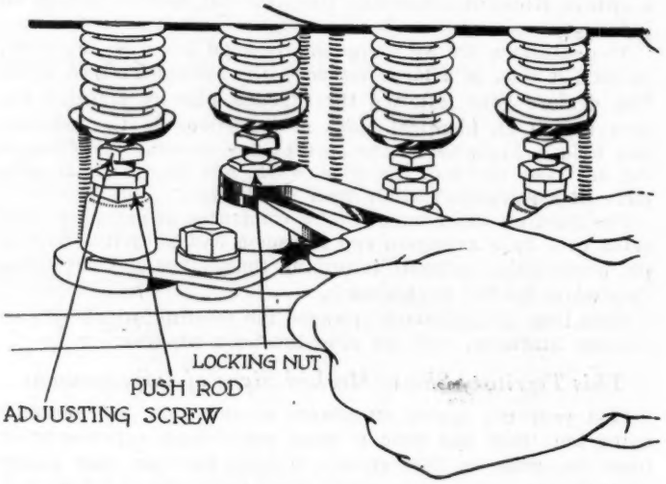
Also, most cams are designed to that with a proper clearance the tappet screw or rocker arm hits the end of the valve stem at very low velocity, and consequently, little noise. Again, with too great a clearance the valve opens late and closes early, because part of the operating surface of the cam is used in decreasing the excess space between the tappet and the valve stem without actually moving the valve. Since, in most engines, the time of opening and closing of the valve is the result of very careful experiment so as to get the maximum power with smooth running, a change of timing such as the above will probably result in less power and not so smooth running.

*Q. If results, as stated in previous answer, are correct, why not adjust so screw or rocker arm just touches the end of the stem?*

Ans. This would make a very quiet running engine, but is not practical because if adjustment is made when engine is hot, when it cools down the valves are liable to be held off their seats due to the difference in contraction of the cylinder, valve stem and tappet, and thus make starting difficult or impossible, due to loss of compression by leakage through the open valve. Further, there are always some inequalities in the cams, rollers and mechanism, so that at some points of the revolution of the cam shaft the valve may be held open when supposed to be closed. Again, with an adjustment of this sort the motor may run at a different temperature than that at which the adjustment was made, which temperature causes a different expansion of the length of the cylinder, the valve stems, the tappets, etc., resulting in the valve "riding."

*Q. What is meant by "riding?"*

Ans. This means that the valve is held off its seat by the end of the stem, being in contact with the tappet screw or rocker arm when the cam is in the position where the valve is supposed to be closed.




How the valve clearance usually is made on an engine with the valves located on the side. Two open end wrenches are essential

*Q. Are there any ill effects other than difficult starting, caused by "riding?"*

Ans. Yes, several, if the adjustment is such that the valves close tightly enough for starting but at normal running temperatures are held open.

First, the timing of the valves is changed, opening earlier and closing later than intended, destroying the smoothness of the running of the motor.

Second, the gas leaks out on the compression stroke, resulting in a weak explosion and initial pressure with loss of power.

Third, gas leaks by, on the expansion strike, with the loss of power.

Fourth, if the motor runs comparatively cool and not up to its full capacity, there is a tendency for carbon to pile up on the valve seat and make a false seat, so that the opening around the valve will be closed by a ring of carbon and at light loads the engine will run quite well, but, if called upon to deliver maximum power for any considerable length of time, this carbon will be burned off, allowing a leak past the valve with its consequent loss of power and irregular running until the carbon false seat is built up again while running at light loads.

Fifth, if the engine is one that runs hot, and is called upon for maximum power often or most of the time, the gases blowing by the valve seat on the expansion stroke are extremely hot and will eventually burn the valve head unless the valve is made of a material that is extremely resistant to their burning effect.

*Q. What should be the clearance between tappet and valve?*

Ans. No general rule can be laid down. It depends on design and peculiarities of each engine. The manufacturer usually has tested and experimented to find the correct clearance and his recommendation should be followed. It varies from .003" to .010".

*Q. How can this clearance be measured?*

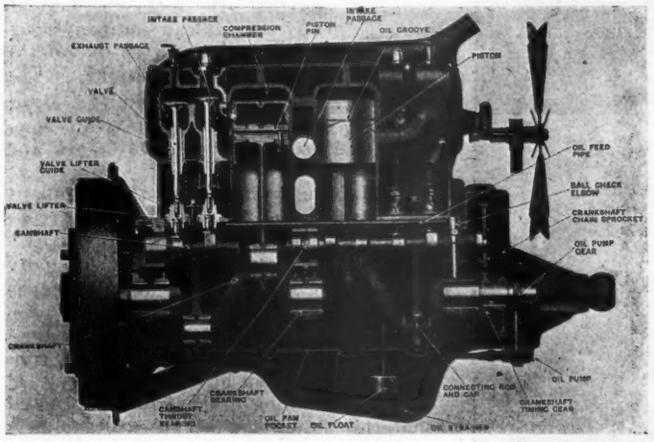
Ans. By placing a piece of sheet metal, card board, business card or folded paper of the required thickness as measured by a pair of micrometers, between the end of the stem and the tappet screw and adjusting the screw until the inserted piece can be moved with just a little friction.

*Q. Does the adjustment of a valve in the head differ from that in a T or L head?*

Ans. Yes, usually a T or an L head can have less clearance than a valve in the head, because the distance from the top of the crank case to the seat of the valve, that is, the length of cylinder which expands by heat and contracts in cooling, is less in the T and L head than in the valve in the head.

*Q. Just how does the length of the cylinder from the crank case to the valve seat effect valve clearance?*

Ans. The cam shaft is held by its bearings a certain fixed distance from the top of the crank case where the cylinders




Typical layout of the valve operation mechanism on an L-head engine showing the relation betwen the various units

fit on. This distance is practically constant, because the temperature of the crank case does not increase very much. If it does, it only adds to what is said later. The valve is located in the cylinder casting a certain distance from the top of the crank case.

Now, considering an L or a T head, when the engine is run until it is heated to its normal running temperature, the distance from the camshaft to the top of the crankcase is slightly increased, due to expansion from a rise in temperature. The cylinder has expanded from heat so that distance from the top of crank case to the valve seat is increased, so the total distance from the sam shaft to the valve seat is increased. This distance is spanned by the valve stem, whose length has been increased by heat, but not to such an extent as the corresponding length of cylinder, because it is made of steel which expands less and, too, the temperatures are not so high; and by the tappet, which has expanded but slightly, due to its much lower temperature.

Now, if the expansion of the cylinder and crankcase were just equal to that of the valve stem and tappet, we could make the tappet adjustment cold or at any temperature and make it so that the tappet nearly touched the end of the valve stem and it would remain constant. Since, however, the total expansions of the two lines of connection of metal between the cam and the valve seat, namely, crank case plus cylinder and valve stem plus tappet, are different, we make the adjustment when hot and everything is expanded and make the clearance such that when these parts cool down and contract by the same amount that they previously expanded, plus an amount to take care of wear and inequalities, the valves will be closed.

Since the two lines of metal in the valve in the head, namely, crank case plus cylinder casting and valve stem plus push rod plus tappet, are longer the total contraction, from the temperature of adjustment, will be greater—hence the clearance allowed must be more.

*Q. Should the exhaust valves and the inlet valves have the same clearance?*

Ans. No, the exhaust valves should have the greater clearance, because their stems become hotter and expand more. This assumes that the two valves are side by side.

*Q. What is the effect, with reference to tappet clearance, if the end of the valve stem is not square?*

Ans. The end of the valve stem and the top of the head of the tappet adjusting screw should both be square with their respective center lines, because, if they are not so and the adjustment is made correctly and then either is turned slightly about its own axis, the clearance will be changed in some cases so much that the valve will "ride." This is especially true if the tappet and valve stem are not exactly in line, and they seldom are.

*Q. Why should the ends of the valve stem be hard?*

Ans. Both the end of the valve stem and the head of the tappets screw should be hard to prevent wear, which would result in an increased clearance, and on the valve stem to prevent "burring" over of the edge around the end which makes it difficult to remove the retainer washer from the end of the stem and also to remove the valve through the guide when it is desired to regrind.

*Q. In overhauling an engine, is it O. K. to grind or file the end of the valve stem or the tappet screw head?*

Ans. Generally not. Great care is exercised in the manufacture of valves and tappet screws as well as in threading the tappets to keep them square, concentric and in line within a very few thousandths. No man can file the end of the valve stem or the top of the head of the tappet screws within three or four times the accuracy required and very few repair shops or garages are equipped to grind with such accuracy.

Further, unless the valve is made from an alloy steel whic hardens all the way through and is so hardened by the original manufacturer, the end of the stem will be left soft, resulting in rapid wear, since the common steels, such as used on 3½ per cent nickel and C. I. head valves have the end hardened for a depth not exceeding .001".

*Q. Should the tappet clearance be adjusted to the required amount immediately on a new engine, an overhauled engine, or after the valves are ground in?*

Ans. No, the clearance should be left to a little greater than the final adjustment to allow all the parts to come to their final bearing and seat. After an overhaul or a grinding in of the valves the engine should be run under load the equivalent of 100 or 150 miles before final adjustment is made.

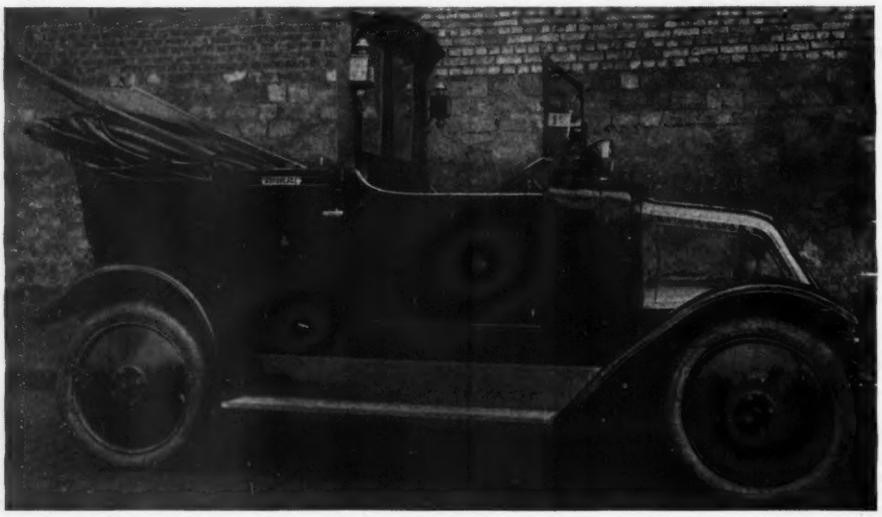
*Q. Why, in the foregoing answers, has such stress been laid on correct tappet clearance and adjustment?*

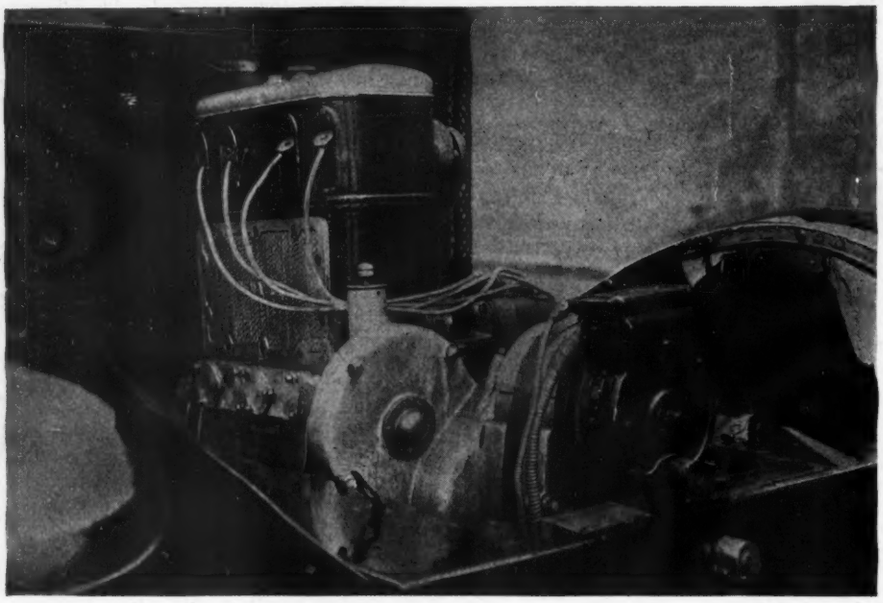
Ans. Because, outside of carbureter adjustment, tappet adjustment is one of the most misused and abused things about an internal combustion engine, especially in automobiles. It is quite generally known that a tappet with too great a clearance causes a disagreeable noise and the tappet adjustment is generally quite easy to get at and change. The result is that every little noise that is heard and can not readily be located is laid to a loose tappet and immediately an adjustment is made.

While the adjustment is easy to get at and easily changed, it is not an easy matter to make a correct adjustment. Drivers of cars, factory service station men and car salesmen, knowing that too great a clearance causes noise, in their desire to have an excessively quiet engine, are apt to have the adjustment made with the clearance so close that eventually all sorts of troubles are encountered, such as lack of power, loss of compression, explosions in muffler, hard starting, burned valves, etc.

# How Fuel Economy Was Obtained in New Renault Four Cylinder Taxis

## *High Gasoline Costs and Plan of Driver Paying for It Make Low Consumption Imperative—Average 22.43 Miles Per Gallon Under City Traffic Conditions*





Renault four-cylinder taxicab, which has many features of interest because of being designed to meet certain operating conditions. Fuel economy was one of the most important considerations. The engine is of the four-cylinder overhead valve type with detachable head and is designed for high torque at low speeds

GASOLINE consumption averages 22.43 miles per American gallon, under normal city traffic conditions, on the new four-cylinder Renault taxicabs, of which 3,200 are about to go into use in Paris. Owing to high fuel costs in France, economy of operation has to be very closely studied and the smallest possible engine capable of doing the work is made use of. It is for this reason that the great majority of Paris taxicabs have twin-cylinder engines of 3.1 by 4.7 in. bore and stroke.

During the last two years the public has been educated to the point of insisting on a four-cylinder taxicab, running more silently and possessing a higher degree of flexibility than the old twins. Citroen was largely responsible for this change, when he put a fleet of his two-seater small four-cylinder taxicabs on the streets of Paris. These vehicles are practically the standard touring car chassis with a suitable taxicab body. The four-cylinder engine measures only 2.67 by 3.93 bore and stroke. It is fitted with a Solex carbureter and averages 24.7 miles to the American gallon. The average weight of this taxicab, with two-passengers aboard, is 2,640 lbs.

### Fuel Economy Chiefly Sought

Chiefly because of keen competition, the Compagnie des Automobiles de Place, which is the largest concern of its kind in France, having a fleet of 3,200 taxicabs, has decided to scrap all its two-cylinder models and replace them, within one year, by specially designed four-cylinder models. The interest of these cabs lies in the fact that they have been designed exclusively from a taxicab standpoint, by the taxicab company's engineers, with fuel economy as one of the most important considerations. The parts are all being built in the Louis Renault factory, but the taxicab company will do all the assembly work and body building.

Because of competition this company has decided on the use of what is considered to be in Paris a big engine, with four cylinders of 2.95 by 4.72 in. bore and stroke. With average loads the cabs weigh 3,300 lbs. All the tests have been made with Zenith and Solex carbureters, and it is with these that gasoline consumption has been brought down to 22.43 miles per gallon. It should be noted that this figure represents average performance under normal street conditions, with an average driver at the wheel, but, of course, with the carbureter and the mechanism in the best condition.

### Features of Engine

The engine is a four-cylinder overhead valve type, with detachable head. The valves, which have a diameter of 1.22 ins., are mounted vertically in the head, and are operated by push rods and rockers, the rods being hidden under a detachable aluminum plate and the overhead gear protected by a cast aluminum cover. The cylinders and the crankcase are separate castings, and the crankshaft is carried in two plain bearings.

A cross shaft in front drives the high-tension automatic advance S. E. V. magneto, which delivers current to plugs inclined in the right-hand side of the cylinder head. An S. E. V. single unit electric generator and starter is at the front end of the engine. Cooling is by thermo-syphon flow, with the radiator back of the engine, in accordance with Renault practice. A flywheel fan creates a draft through the radiator.

Lubrication is pump circulating type,

with the supply of oil first brought up to a copper tamp immediately over the rocker shaft. The lubricant drops directly into oil holes on the shaft bearings and on the rocker arm pivots. A groove on the top of each rocker arm carries the oil to the ball head of the push rod, and the return is made through the hollow push rod to the cam. Surplus oil returns by the pushrod housing to collectors for the main bearings and the connecting rod bearings.

### High Torque at Low Speeds

Because of the special work these vehicles have to do, the engine has been laid out for high torque at low speeds. The exhaust opens with a lead of 30 deg. and closes on dead center; the intake opens four degrees after upper dead center and closes 20 deg. after lower dead center.

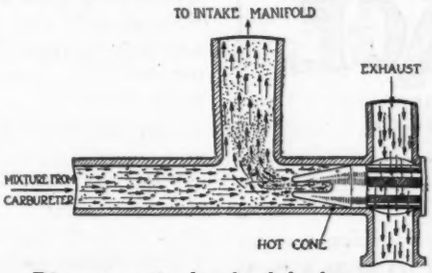
The old two-cylinder models had fixed ignition. In the new four-cylinder types the advance is 0 at 500 revolutions, increasing to 27 deg. maximum at 1,500 revolutions. Compression has been carried to the high figure of 85.3 lbs. per square inch, this being possible with the I-head type of engine by the use of a 50 per cent mixture of gasoline and benzol. The power curve shows 17 hp. at 1,200 revolutions and remains practically flat to 1,800 revolutions, dropping off abruptly after this figure.

The method of operating by the Compagnie des Automobiles de Place is for the drivers to purchase their own fuel, and to retain a certain percentage of their earnings, on a sliding scale, the amount going to the driver increasing with the total earnings.

In this way the men are interested in operating with the smallest amount of fuel, and they are the first to object if gas consumption becomes abnormal. Thus when this company found it necessary, in order to meet open competition, to adopt a four-cylinder engine in place of a twin, it had to be certain of getting the same gas consumption with the bigger as with the smaller engine.

The company was also interested in adopting a bigger and more flexible engine than those used by rivals, if this could be done without running the gasoline costs too high. The actual gas consumption is higher with the Renaults than with the Citroens, but if weight and seating accommodation are taken into consideration, the Renault shows a higher fuel efficiency.

## Frontenac Vaporizer




Diagrammatic sketch of the hot cone system used to assist vaporization in the Frontenac engine. This engine was described in detail in a recent issue. The vaporized portions of the fuel pass upward into the intake. The hot cone vaporizes the heavier particles of the fuel, allowing them to join the in-going gases which flow up the vertical intake passage

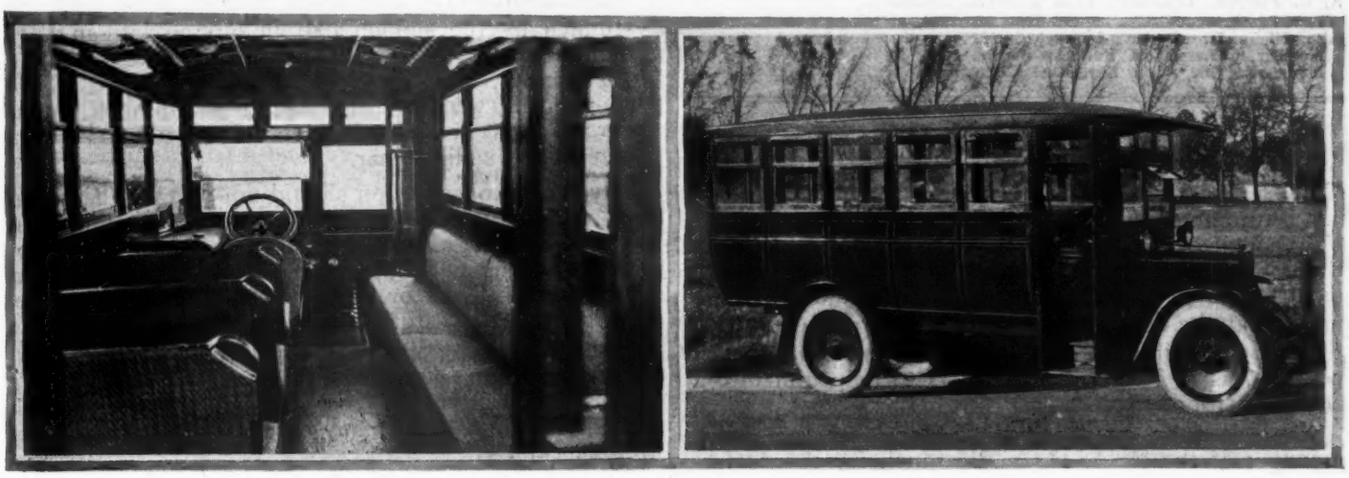
### Gasoline Cost in France

The gasoline-benzol mixture is sold to the drivers at the rate of 5 frs. per 5 liters. Considering the dollar as worth 12 francs, this works out at 31.6 cents per American gallon, compared with the average retail price around Paris of 62 cents per gallon. The explanation is that, having guaranteed gasoline prices would not rise to more than three times pre-war prices, the company is obliged to sell to the men at this figure. The cost to the company is about 48 cents per gallon, on an average. The gasoline is imported from America and the benzol is obtained from Germany. Owing to the depreciated German mark, the latter fuel is cheaper and would be used exclusively if it were possible to get sufficient supplies. This cannot be done, however, owing to the fact that the French government monopolizes large quantities of the benzol imports in order to market its "national fuel" composed of equal parts of benzol and alcohol.

### All Braking on Rear Wheels

The new taxicabs have cone clutch, three-speed transmission and spiral bevel rear axle with transverse rear spring as on the Renault touring car. This transverse suspension has proved specially satisfactory for variable loads.

The change speed lever is in the center, the driver being seated on the left. The American standard gate has not been adopted, for it is considered unsuitable for the average driver possessed of little mechanical skill.



## Service Bus for Eighteen Passengers

THIS bus body is designed to meet the needs of a bus with capacity for 18 passengers or less. It is mounted on a Service speed truck one-ton chassis.

The body itself is of conventional design, filled with windows to raise, pay-as-you-enter entrance opposite the driver, emergency rear door, rattan covered seats with spring bottoms and backs, and ample space between seats to allow adequate knee room. Five passengers may be seated across the rear end, and six passengers on the left hand side face forward, while the other six face inward.

The bus is lighted by electric dome lights of sufficient capacity to permit reading. A fully upholstered bucket type, independent seat is provided for the driver. Provision is made for the application of the fare register, and for a route-card in the upper-right-hand corner of the body. This card may be enclosed and illuminated.

Due to the special spring suspension of this truck, which means that the truck itself is suspended on three points, this bus is easy riding, and is one of the determining factors in influencing the popularity of buses.

This outfit complete, as shown, including depreciation, driver's hire, maintenance, overhead, insurance, taxes, and all legitimate charges, under competent management, can be operated for from 16 to 19 cents per car-mile, it is claimed. Service Motor Truck Co., Wabash, Ind.

# MOTOR AGE

Reg. U. S. Pat. Off.
PUBLISHED EVERY THURSDAY

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Vol. XLI Thursday, February 23, 1922 No. 8

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SUBSCRIPTION RATES
United States, Mexico and U. S. Possessions.....$3.00 per year
Canada.....5.00 per year
All Other Countries in Postal Union.....6.00 per year
Single Copies.....35 cents
Subscriptions accepted only from the Automotive Trade

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.
Entered as second-class matter Sept. 19, 1899, at the post-office at Chicago, Ill., under the Act of March 3, 1879.
Member of Associated Business Papers, Inc.
Member of the Audit Bureau of Circulations.


## It Is Up to Dealers

THE passing of Harry Moock from the National Automobile Dealers' Association to the sales department of the Hudson-Essex factories is more than an incident. It is of much more significance than most of the changes in personnel. It would appear to mean that the dealer is not as jealous of his own position, not as willing to pay to get himself in a better position, as at least one factory is to help him into a better position.

There can be no doubt that Moock as the active manager of the N. A. D. A. did much for the dealers of this country. The fight that the N. A. D. A. made on tax matters and the personal service that was extended to the dealer in the way of service as to tax and freight charges have been very large items to those who have availed themselves of the opportunities. The bringing together of a committee representing the manufacturers with a committee of dealers was a big thing and it is resulting in much good. But it is needless to go on reciting these items.

The fact is that the dealers of this country need an association and need it badly. The bigger and better dealers of the country could well afford to pay the expenses of such an association for the benefit it will have in raising the standard of all dealers and in the elimination of the uneconomic, short lived dealership. There is a great field for the work of such an association, even if this association did not offer the best dealers any specific service. But such service is always forthcoming from an association, if the members are the right kind.

The point is here: If the dealers of this country want an association to more quickly solve the problems that are before them, they should back that association and, combined, they could well afford to pay more for the man to lead their activities than can any single factory which wants such a man to assist the dealers who sell the products of that factory.

The dealers should get together in an association and make this organization of such importance that its leader will never be tempted to leave its service for any lesser activity. In other words, the combined interests of the dealers of the country should be greater than the interests of any single factory group of dealers.

The fact that Moock has displayed the ability which caused him to be called into the service of a factory for the purpose of carrying on dealer work should be a sharp lesson to dealers that such work is worth while. If it is worth while to a factory, it certainly should be worth while to the dealers themselves.

## What the Shows Tell Us

SIX weeks of the 1922 automobile show season have passed and two facts of importance to the entire trade have been established:

1—The public has a keen interest in the 1922 cars and is already buying them in the cities and will begin to buy them in the country districts when the closed road season comes to an end.

2—Smaller city and town dealers, who were so stunned by the sudden halt in buying late in 1920 that they saw no hope of business stimulation in the 1921 shows, have recovered from the blow and are cooperating with the distributors and branch managers to make the present show season the start of a determined selling year.

The second observation should not be taken to mean that dealers in great numbers are attending the shows. The stagnation of 1921 eliminated many automotive tradesmen, reducing territorial organizations in many cases by half or more of their former strength, but of the dealers still actively or semi-actively in the passenger car field, 50 to 75 per cent have come in from the majority of territories to attend the show at the distribution center, to meet distributors and branch officers and, in a good many cases, to order shipments of 1922 cars.

## The Automobile Tax Burden

THE automotive dealer must have read the newspapers with a good deal of satisfaction last week as he noted the change of attitude in Washington following the first suggestion that the automobile owners of this country be taxed to pay the soldier bonus. For once, the farmers, who constitute about 50 per cent of the individual automobile owners, the automobile clubs and the industry joined in a protest and very quickly the first suggestion was buried.

The representatives of the automotive industry and

the others who joined in the objections to additional taxes on transportation made it quite clear in their protests that they were not objecting to the payment of a bonus to soldiers, but that they were objecting to putting the chief cost of this bonus on automotive transportation.

Late in the week President Harding put out a suggestion that the bonus funds be provided by a general sales tax. He is not likely to meet a strong opposition to this from the automotive industry, but this is not quite fair to the industry at that. The products of this industry are now paying quite a heavy sales tax and, strange as it may appear, when some sales taxes were eliminated early this year that on automotive transportation was left standing. Now comes the suggestion that a general sales tax be levied and no exception is made of this industry, which already is paying a heavy tax.

Some months ago the automotive industry asked that a general sales tax be levied in place of the stigma taxes. This was not done, and, as a consequence, if a sales tax is now decided upon, the new axle that is needed for the truck which delivers groceries in the town or carries the farmer's produce to market will be doubly taxed.

The following statement issued by the National Automobile Chamber of Commerce tells a graphic story of the tax load this industry is carrying:

| | |
|---|---|
| **Federal Excise:** | |
| Motor car | $ 64,388,000 |
| Motor truck | 11;640,000 |
| Parts, tires, etc. | 39,518,000 |
| | $115,546,000 |
| **State License:** | |
| (Revised estimate of Bureau of Public Roads) | $120,000,000 |
| **Gasoline:** | |
| (Fifteen states) | $ 11,500,000 |
| Municipal, etc. | 11,000,000 |
| Total Special Taxes | $257,046,000 |
| ***Personal Property:** | |
| Thirty-eight states and British Columbia | 75,000,000 |

*The tendency in most states is to assess motor vehicles at full value, though placing only nominal valuation on other forms of personal property.

Note: Fifteen states have an excise gasoline tax; in Oregon this is two cents per gallon; in Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Kentucky, Louisiana, Montana, New Mexico, North Carolina, Pennsylvania, South Dakota and Washington, one cent per gallon. Bills are impending in six other states Massachusetts, Maryland, New Jersey, Rhode Island, South Carolina and Virginia, in amounts varying from one to three cents per gallon.

Most of the 45 state legislatures which held sessions in 1921 increased registration fees.

## The Saturation Point

THE saturation point of automobile ownership is an old and much discussed question. Most of the discussers have been roundly cussed by those who knew something about the industry, because most of the discussers knew nothing at all about automobiles. Most of the articles on saturation have been written by light headed economists who have not taken into consideration the advance of civilization and the constant changing social conditions.

Now it is interesting to know what the chief producer of automobiles has to say on this subject. In a recent signed article in System, Henry Ford, who has manufactured as many as one million automobiles in one year, tackled this question quite fearlessly. The fact that he did not write to the lengths of the economists on this point does not seem to have affected the completeness of his solution. It is brief and very much to the point. He says:

**"But how about saturating the market?**

**"I have always believed that it is impossible to saturate a market excepting by having the price of what one sells above the price of what the people in the market can pay."**

There you have it and not one of the economists who have explained why the market was to become saturated have ever thought of it. And Mr. Ford might have added that as long as the motor vehicle can pay more than its cost and keep in direct revenue, there is little danger of a saturation until every one who uses transportation has it. Today it is possible to own your own transportation, thanks to the automobile.

## Some Requirements for a Stock Room Personnel

THERE is nothing more pleasing than a good stock clerk, and in the same manner there is nothing quite as maddening as a poor stock clerk. Perhaps the number of really efficient stock clerks is far in excess of the number who are only good record keepers. Undoubtedly the accurate recording and inventorying of spare repair parts is the first function of the stock room. The ability to execute this phase of the work is about all that is required of the average good stock keeper. But to become eligible to the class of really efficient stock keepers something additional should be demanded.

This something is a knowledge of measurements and the more common standards of construction concerning bolts, screws and nuts. Lack of knowledge in this respect does not mean that the stock room as an institution is going to rack or ruin, but it does mean that it has an influence on the efficiency of the workmen. Its influence is apparent when workmen are obliged to remain at the stock dispensing window for long periods awaiting some small, yet important bolt or screw. If the screw or bolt in question is a catalogued part there are no delays. If the request is, for example, for an 8-32 fillister head screw, the screw will not be forthcoming, that is not until after the exchange of unnecessary and oftentimes unsympathetic language and a consequent temporary tieup of the workmen's operations. The same holds true regarding the measurement of valve stem diameters, and the various oversize articles which must be accurately micrometered.

Stock room personnel is chosen with no particular regard to its fitness. A stock clerk of today may have been the chief clerk or head bookkeeper of yesterday. In fact many are drawn from these ranks. The man who employed them was solicitious only about their ability to handle records and memorize parts numbers, which as far as it goes is splendid. But why not inquire further and determine if the applicant can read a scale, a micrometer, and whether he is able to recite the U. S. and S. A. E. thread standards for bolts of various diameters. The stock room is to the large service station what the commissary is to the army. And as soldiers are sometimes almost unreasonable in their demands on the commissary so are workmen in their demands on the stock room. To command the workers' respect the stock room must be literally on its toes at all times.

# Conditions Point to Improvement

## Dealer Confidence Key to Increased February Sales

### Optimism Is Reflected in Stocking of Cars and Large Attendance at Shows

NEW YORK, Feb. 21—Some improvement in actual sales at retail has been apparent in February as compared with January. Most of the undeniable betterment in tone has been based, however, on the increased confidence of dealers generally in a fair spring business, beginning the latter part of March. This confidence is reflected in the stocking of cars. This is true, especially, in agricultural districts where none has been carried in dealer showrooms for months.

Another indication of the greater optimism of dealers has been found in the large numbers that have attended shows this year, particularly in Kansas City. At the show there last year dealers in the outlying districts were so discouraged over the outlook that they did not think it worth while to attend. This year the dealer attendance numbered between 800 and 1000.

Companies which are watching conditions in the South found comfort in the fact that retail sales at the Atlanta show ran materially ahead of last year. In fact the outlook through the cotton belt is more cheerful.

While sales of passenger cars thus far this year have not been large enough to cause wild enthusiasm, they have been so much better than they were for the same period last year that the prediction of a considerably better business for the first quarter of 1921 already is vindicated.

The tone of the truck market continues to improve. Reports not only from rural but from industrial centers state that there is a considerable demand for light delivery vehicles. Aggregate sales of this type of truck this year will be large.

Business of parts and accessory makers, which has been materially better since the turn of the year, is holding up well, and there are indications of continued improvement. They now are getting the full benefit of inventory deflation by vehicle manufacturers.

### NEW DAVIS MODEL

Richmond, Ind., Feb. 20—A new model 71 has been added to the Davis line, this to make its appearance March 1. The new model will be smaller in some respects than the Model 61-67 which is continued. The price on the new model is $1195 as against $1795 for the current model. The new model includes Continental 6Y engine, 3⅛x4¼ in., Timken axles, Delco starting, lighting and ignition, Stromberg carbureter, Warner gearset, Borg & Beck clutch, Peters universal joints and a Borg & Beck steering gear. The wheelbase is 114 in. For the present only the phaeton will be produced, but later a phaeton-sedan will make its appearance.

## Ford Denies That He Will Buy Wills, Dodge or Pierce

Detroit, Feb. 20—Henry Ford asserts there is "absolutely not a word of truth" in the reports that he is negotiating for the purchase of the C. H. Wills & Co. or any other motor car plant.

An official of the Dodge Brothers Motor Car Co. asserts that sale of the plant to Ford or any other interest is not contemplated.

A dispatch from Buffalo quotes M. E. Forbes, vice president and general manager of the Pierce-Arrow Motor Car Co., as saying that there is no foundation for the report that Ford is buying control of that company.

## Atlanta To Have National Show Franchise, Says Reeves

Atlanta, Ga., Feb. 18—Approximately 200 members of the Atlanta Automobile Assn. heard the address at a recent meeting of the body by Alfred C. Reeves, general manager of the National Automobile Chamber of Commerce, on the present condition of the industry and the prospects for the coming year.

Reeves expressed the opinion that production in 1922 will be about on a par with 1921, save that a larger number of motor trucks will be made this year.

Reeves further declared that Atlanta is to be granted a national show by the N. A. C. C.

### OWEN MAGNETIC SALE

Wilmington, Del., Feb. 20—Charles F. Ross, Robert Pennington and James P. Harris, receivers for the Owen-Magnetic Motor Car Corp., have given notice that on March 7, 8 and 9 they will offer for sale the personal property of the company, comprising machinery, fixtures, automobile parts and materials. The sale will take place at Forty Fort, Luzerne county, Pa.

### JORDAN BOOKS 2782 ORDERS

Cleveland, Feb. 17—The Jordan Motor Car Co., at a dealers' convention, reported that uncancelable orders had been taken for 2782 cars for delivery in limited allotments during the next four months. The company is in capacity production and the prospects are that it will remain so for several months. In the last quarter of 1921 Jordan showed an increase of 41 per cent in volume and 42 per cent in cars.

## Durant Will Crank Rival to Ford Flivver March 9

### Car to Sell Complete for $348 Will Be Shown for First Time in Washington

NEW YORK, Feb. 20—The following statement was issued today from the headquarters of Durant Motors, Inc.:

"W. C. Durant, president of Durant Motors, Inc., has accepted a contract to build in quantities a four-cylinder five-passenger automobile to retail at $348. The car will be on exhibition at the city of Washington March 9. The name of the car and the company will be made known on that date."

Further details in regard to this sensational announcement were absolutely refused. It was stated positively that nothing more would be given out until the date fixed. Durant and his family start this week for Palm Beach to spend three weeks and his associates here profess ignorance of the project.

It was positively stated at the Durant offices, however, that there was no joker in the statement and that the announcement covered a bona fide proposition of magnitude.

The price of the five-passenger Ford car, without starter and demountable rims, is $348. With the added equipment, it is $443. The Durant car will be equipped with both starter and demountable rims.

The new car, which will compete with the Ford and which, it is assumed, will be necessary to produce in quantities if it is to be profitable, has been developed by Durant engineers, but no information is obtainable as to where the experimental work has been done.

The manufacturing company undoubtedly will be a subsidiary of Durant Motors, Inc. Whether or not a factory site has been selected is not known, but Durant's associates did not take seriously a suggestion that the new car might be built in the big new factory of the Willys Corp. at Elizabeth, N. J.

Considerable significance may be attached to the fact that Edward Ver Linden, who is president of the Durant Motor Car Co. of Michigan and who formerly was president of the Olds Motor Works, has gone south "to build up his health" almost simultaneously with the departure of Durant for Florida and that Ver Linden probably will visit Palm Beach.

It is understood also that Fred W. Warner, formerly head of the Oakland division of General Motors, who has been in charge of the selling of Durant stock in Michigan, will spend considerable time at the Durant plant at Lansing while Ver Linden is absent.

# Lincoln Sales Policies Are Held Up Pending Full Data

## Distributors to Control Cities, Ford Branches to Direct Small Center Sales

DETROIT, Feb. 20—Official announcement of its sales and manufacturing policies under the Ford regime has been deferred by the Lincoln Motor Co. pending the working out of a few remaining details, but it is evident in the results thus far accomplished that sales in the larger cities of the country will continue to be through the present distributor organization.

In the smaller cities the Lincoln dealers and the Ford dealers who will be authorized to sell Lincoln cars will operate directly under factory control through the medium of the branch plants. In the big cities the present distributors will conduct retail sales rooms and will distribute to Ford dealers whom they authorize in their cities.

Investigations are now being made by the 35 branch Ford plants of the marked possibilities for Lincoln cars in their individual territories and their recommendations will play a large part in the dealer authorization. Changes will be made in many localities but the efficient dealers will continue to function.

Much of the detail of the sales plan was laid before a meeting of prominent Lincoln distributors at the factory last week which was attended and presided over by sales executives of both the Lincoln and Ford organizations. For the time being, apparently, the Ford sales organization has been allowed to function by itself, while the executives give all their study to the Lincoln problems. Manufacturing at the plant is under the observation of Charles C. Sorensen, the Ford chief of manufacturing operations, and changes which will be made in production methods will follow his recommendations. For the present the plant is working on a schedule of 20 to 30 cars daily which will be continued until the production changes are fully determined.

San Francisco, Cal., Feb. 21—Every Ford agent in California has been appointed a sub-dealer for the Lincoln, according to telegrams received from the Lincoln factory by the Ford Motor Company of California, and by Richard Carlson, branch manager for the Walter M. Murphy Motors Company, Lincoln distributors for California. Most of the Ford dealers are preparing to maintain Lincoln showrooms in addition to their Ford display space.

### STANDARDIZED VALVE STEMS

Cleveland, Feb. 17—At the meeting of the Tire & Rim Assn. held here yesterday the matter of standardized valve stems for outside inflation was referred to a committee which will shortly report to the association for further action. Considerable interest has been aroused in the subject, particularly since the larger tire concerns are behind the movement for standardization and it is very possible that some arrangement will be made in the near future to permit of uniform construction permitting of outside inflation on disk wheels.

# Waterloo Club to Establish Odd-Size-Tire Clearing House

Waterloo, Ia., Feb. 17—The Waterloo Motor Club, which has done much in the way of service for dealers and service stations, is planning to establish an Odd-Sized-Tire Clearing House for the state of Iowa.

Recently the management of this club has had many complaints from members who are owners of the older automobiles that they could not obtain tires for these cars. A subsequent investigation showing that a good many of odd sized tires were in stock of dealers who were wondering where they could sell them. It seems that the customers wanting an odd sized tire and the dealer having that tire did not meet under ordinary circumstances.

The new plan is to circulate a questionnaire among all dealers in the state and ask them what size tires they have on hand that are dead ones and what odd sizes they have a demand for. The results of this questionnaire will again be circulated to the tire dealers.

### DAVIS PRICES LOWER

Richmond, Ind., Feb. 20—Price reductions have been made by the George W. Davis Motor Car Co. on the five models which comprise the Davis line. Reductions run from $20 to $500. The new prices, compared with the old, are as follows:

| | Old Price | New Price |
|---|---|---|
| Touring | $1795 | $1595 |
| Fleetaway | 1895 | 1695 |
| Man o' War | 1895 | 1595 |
| Sedan | 2595 | 2195 |
| Coupe | 2595 | 2095 |

### WARD LA FRANCE LOWER

Elmira, N. Y., Feb. 20—The Ward LaFrance Truck Corp. announces substantial reductions on its truck chassis prices. The schedule follows:

| | Old Price | New Price |
|---|---|---|
| Model 2B—2½-3½ ton | $3590 | $2990 |
| Model 4A—3½-5 ton | 4690 | 3990 |
| Model 5A—5-7 ton | 5590 | 4590 |

### TEMPLAR TO RAISE PRICE

Cleveland, Feb. 20 — The Templar Motors Corp. announces that the prices on its various models will be increased, effective March 6. The new prices have not yet been made public. President Bramley asserts that "pre-war prices, to which the Templar had returned months ago, are too low."

# Chrysler Resigns Positions With Willys-Overland Co.

## Rumors Rife as to What Connections in Automotive He May Accept

NEW YORK, Feb. 20—Walter P. Chrysler has resigned as executive, vice president and a director of the Willys-Overland Co. and all other Willys companies. No successor will be appointed and he has made no announcement concerning his plans for the future.

The resignation of Chrysler came unexpectedly. It followed by a day his resignation as a director to make way for an Ohio resident. This step was voluntary and it was announced after the meeting at Toledo at which four new directors were elected that Chrysler would retain his position as executive vice president.

Chrysler has three or four flattering offers under consideration, but it is understood he has not yet decided which to accept. In the meantime he has leased offices in this city.

After attending the directors' meeting in Toledo, Chrysler went immediately to Detroit. He is chairman of the board of the Maxwell Motor Corp. and is understood to have a considerable interest in that company, but his friends do not believe he will take over the active management.

So far as can be determined, there is no basis for the report that he will become president of the General Motors Corp.

With the action taken at Toledo, John N. Willys dominates the board of directors of the Willys-Overland Co. and the fight between the bankers and the other interests for control has come out into the open.

Before the bankers' plan for a bond issue of $25,000,000 can be presented to the preferred stockholders, it must be approved by the board of directors. Lacking this approval, this refinancing program will be held up. Even if it reached the preferred stockholders, it would not be accepted by holders of 75 per cent of the preferred stock.

Representatives of the bank creditors met Feb. 16 at the Chase National Bank to determine upon a course of action.

While the assets of the Willys-Overland Co. are more than $100,000,000, the bank loans total only $16,556,000 at this time and there is $4,000,000 in cash on hand.

### NEW BIDDLE-CRANE PRICES

New York, Feb. 20—The Biddle-Crane Motor Car Co., Inc., has made the following reductions in prices:

| | Old Price | New Price |
|---|---|---|
| 2-passenger touring | $3475 | $2950 |
| 4-passenger touring | 3475 | 2950 |
| Coupe and sedan | 4350 | 3950 |

# Bordino Will Drive Record - Breaking Fiat in America

### Car Has Eight-Cylinder-In-Line Engine—Turns Over Under Load at 5000 Revolutions

PARIS, Feb. 11—Carrying with him a 183-cu. in. Fiat racing car, Pietro Bordino has sailed from Genoa for New York, with the intention of taking part in all the races on the California tracks and in the Indianapolis 500-mile speed contest.

Bordino has made numerous visits to the United States, but always in the capacity of mechanician. He rode with Lancia in the American Grand Prix races of 1906 and 1907 and with De Palma at Savannah in 1908. As a race driver, his best performance was the handling of the 300 h.p. Fiat on Saltburn beach, England, in 1911. Although a regular member of the Fiat racing team, it is declared by the directors of the Fiat Co. that Bordino is undertaking this racing campaign in a private capacity, the factory doing nothing more than to loan him the car. There is a possibility that Louis Wagner will also come to America with a Fiat, but will only take part in the Indianapolis event.

The Fiat eight-cylinder-in-line racing car is considered to be the fastest car in Europe in its class, for at Brescia, Italy, last September it made a lap at an average of 93.4 miles an hour, thus creating a world's road record. Since then the speed of the car has been increased.

The engine has eight steel cylinders with a common water jacket for each set of four. Only two valves per cylinder are used, these being mounted in the head and operated by two overhead camshafts, which are driven by a vertical shaft and bevel gearing at the rear of the cylinder block. There are two magnetos, driven off a cross shaft from the vertical shaft. Two carbureters are fitted, one for each group of four cylinders, while a feature of the engine is the use of roller bearings virtually throughout. It is declared that the engine will turn over under load at nearly 5000 revolutions.

Entirely recovered from his smash in Belgium, Andre Boillot has rejoined the racing department of the Peugeot Co. This firm is entered for the French fuel consumption Grand Prix at Strasbourg, in July, when Boillot will reappear for the first time, having as his teammate Artault, formerly a Voisin race driver.

Rene Thomas, winner of the 1914 Indianapolis race, has been made captain of the Delage racing team and will appear in all 1922 races in Europe for this firm.

### LOCOMOBILE IN OPERATION

Bridgeport, Conn., Feb. 20—Operations in the factory of the Locomobile Co. are continuing unhampered during the receivership and a steady volume of business is being received, although officers of the company had expected a lull. Managers of the branches at New York, Boston, Philadelphia, Chicago, Los Angeles and San Francisco have been appointed ancillary receivers for the property in those districts except in Chicago, where the Central Trust Co. has been selected to administer the company's affairs.

### SHERMAN TO BROADEN FIELD

Chicago, Feb. 20—The merchandising department of the Automotive Equipment Assn., under the direction of Ray W. Sherman, which has been waging a nation-wide "Ask 'em to buy" campaign for several months, is ready to broaden its work and include the service stations of the country in its educational work. To the present time the attention and efforts of the department have been directed toward the accessory departments of the industry.

The new work will carry the campaign for better sales into the back end of the shop, where it will seek to better service. Equipment, operations and everything that will better the service to the owner is to be included in the new work. The same earnest effort that has gone to better the retailing of accessories will now include the mechanic and the universal commodity, service, which he has for sale.

### NEW KELSEY MODEL

Newark, N. J., Feb. 19—The Kelsey Motor Co., which will produce a friction drive car, has announced a new four cylinder model. The touring car and roadster will sell for $985; the coupe at $1400 and the sedan at $1450. The prices of the six cylinder open model have been reduced from $1800 to $1525 and the closed model from $2700 to $2175.

### NEW ASSOCIATION FORMED

Olean, N. Y., Feb. 18—Officers have been elected by the newly formed Olean Automobile Dealers Assn., as follows: President, Dr. R. N. Forbes; vice president, Charles Chew; secretary-treasurer, Shirly Vincent. The association was the outgrowth of the automobile show held in the state armory recently.

### DEALERS FIX VALUES

Wilmington, Del., Feb. 17—Through the Wilmington Automobile Trade Assn. an effort is being made to solve the used car problem here. A policy of concerted action in fixing trade-in values is advanced and a committee is now at work along this line.

### LOWERS SERVICE CHARGES

Columbus, Ga., Feb. 17—The Overland Sales Co. of this city is featuring in its service advertising that the company has returned to the pre-war rate of labor charges. Customer charges are based on $1 an hour.

# Italy Prepares Two Races for 1922 With Large Prizes

### Events Will be International, Germany Competing for First Time Since 1914

PARIS, Feb. 11—The Automobile Club of Italy announces two automobile races for next September, with cash prizes totalling 300,000 liras ($78,000 normal exchange), in addition to trophies worth about 50,000 liras ($10,000). This is the first time cash prizes of any importance have been offered in Europe.

There will be two races, the one Sept. 3 being for cars having a piston displacement of 122 cu. in., and the second event, one week later, being for 91 cu. in. racing mounts. For the big car race there will be 225,000 liras ($45,000) distributed among the first ten, the winner getting 100,000 liras of this amount and the second man 40,000 liras. There will be three lap prizes for the leader at the 40th, 50th and 60th laps. In the light car race the winner will get 50,000 liras cash and a 10,000 liras gold trophy.

A semi-artificial speedway built inside a former royal park only seven miles from Milan enables the club to hold its race on a commercial basis and to guarantee these big cash prizes. The park is entirely surrounded by walls nine ft. high, so that all who wish to see the race will have to pay for admission. Milan has a population of 600,000, while Turin, which is the most important automobile center in Italy, and only 80 miles away, has a population of 450,000.

The races will be open to all comers, and for the first time since 1914 German cars will compete with Allied machines. The club has already accepted the entries of complete teams of Benz, Mercedes and Opel cars. French, Italian and British participation is certain.

### HARD TO UPHOLD LAW

St. Paul, Minn., Feb. 18—Judge H. O. Hanmft has handed down a decision upholding the state automobile tax law, but declaring it contains "glaring inequalities and irregularities seriously affecting a large number of individuals" and that it was "difficult to hold the act constitutional." The act taxes automobiles according to the factory prices on all models. As a result, some persons owning a 1921 model are paying a higher tax than owners of 1922 models of the same cars because prices have fallen.

### SAXON STATEMENT

Detroit, Feb. 20—The Saxon Motor Car Co. shows an operating deficit of $396,263 for the year ended Dec. 31, 1921. Bank loans were reduced from $500,000 to $100,000 and accounts payable from $249,000 to $190,000. The inventories are valued at $457,000 as against $1,770,000 a year ago. Cash on hand was $72,000 as compared with $476,000.

# Willys Settlement Plans Hold Chrysler Six Hope

### Overland Engineers' Final Development of Car and Sales by Willys-Overland Not Impossible

TOLEDO, Feb. 18—The Willys Corp. is making good progress under the receivership, according to Receivers C. O. Miniger and Frank Kennison. Miniger has returned from a week spent at Elizabeth and in New York.

Attorney George P. Hahn, Toledo, is working upon two claims which the Willys Corp. will seek to have adjusted with the Willys-Overland Co., which may mean much to the final disposition of the affairs of the corporation.

It is understood that one of the claims is on a contract involving the production of the Chrysler Six model by the Overland engineers and sales of the car by the Willys-Overland Co., on which claim the corporation will seek to collect about $2,000,000.

The other is a claim based upon the sale of a common stock of the Overland to the corporation. The sale was made at $18 a share and a few weeks after that the stock dropped in market value to $6. The corporation attorneys believe they have a claim of something in the neighborhood of $5,000,000 on this item.

There are many more questions involved in the claims, however. The settlement of them will probably precede any re-financing on the part of the Willys-Overland Co.

It is thought that the proceeds of claims and the sale of the Elizabeth plant will be sufficient to take care of the banker creditors and that securities held by the corporation may be enough to cover the claims of preferred stockholders.

The Electric Auto-Lite Corp. at Toledo is now operating on an excellent basis. It is employing about 1500 persons and has been selling its products to a diversified list of passenger car and truck manufacturers in many parts of the country.

#### RAILROAD FOR I. H. C. PLANT

Fort Wayne, Ind., Feb. 17—Twenty high officials of the Pennsylvania, Wabash & Nickel Plate railroads were in this city recently, arranging for the beginning of immediate construction work on the belt railroad which is to be constructed for the purpose of giving top-notch shipping facilities to the big truck plant which the International Harvester Co. is to erect just east of the city.

#### HEADLIGHT GROUP OFFICIALS

New York, Feb. 19—The following officers have been elected by the headlight device group of the Motor and Accessory Mfgrs. Assn.: Chairman, J. H. Cattell, secretary-treasurer of the Warner-Patterson Co., Chicago; vice chairman, Charles Franck, manager of the Holophane Glass Co. of New York; secretary, Fred H. Ford, manager of the road lighter department of the C. A. Shaler Co., Waupum, Wis.; treasurer, Howard H. Parker, sales manager of the Macbeth-Evans Glass Co., Pittsburgh. The next meeting of the group will be held at the Hollenden Hotel in Cleveland April 4 and 5. One of the most important activities which the group is expected to take up is that of standardization.

## New N. A. D. A. President

W. J. Brace, who will direct dealers' national organization, is also president of Hudson-Brace

# Ford to Build Wheels in Hamilton, O., Tractor Plant

Hamilton, O., Feb. 18—Wheels for all types of Ford cars will be made at the Hamilton plant of the Ford Motor Co., it is officially announced. Machinery, used in the making of tractors, has been sent to River Rouge, where, it is stated, the tractor business will be concentrated.

It is hoped to reach a production of 300 sets of wheels within 60 days and this total will be gradually increased until it reaches the full requirement of the Ford Motor Co. This, it is stated, will be 4000 sets daily, and will necessitate the employment of about 7000 men.

It also was announced that the local plant will be used in the manufacture of locks for passenger cars.

Ford's holdings in Hamilton exceed $3,000,000 and include a hydro-electric plant.

#### NEW ELGIN TOURING PRICE

Chicago, Feb. 20—The Elgin Motor Car Corp. has priced its new touring car at $1695. Prices given out at the New York show for this new model 700 were the prices on the old line of cars. This price *is f.o.b. factory at Argo, Ill.*

# Hoosier Show Circuit Plan Includes "Ask 'Em to Buy"

### State-Wide Program Will Bring Value of Merchandising Home To Dealers

INDIANAPOLIS, Feb. 17—Utilizing the automobile shows for general business improvement is the spirit back of a program that has been completed by the newly organized jobber division of the Indiana Automotive Trade Assn. The jobber division was broadened and reorganized in January. Under the leadership of the manager of the state association the jobbers will have five sectional meetings, Evansville Feb. 20, Terre Haute Feb. 21, South Bend Feb. 27, Lafayette Feb. 28 and Indianapolis March 1.

The A. E. A. "Ask 'Em to Buy" film will be featured in each of the meetings. The programs for the meetings are arranged with the single idea of educating the retail automotive merchants to the value of the sales promotion movement and how it can effectively be tied-in with the many local shows throughout the state.

The Indianapolis, Evansville and Fort Wayne shows will be the openers for a circuit of shows. The dealers will be encouraged to attend the Indianapolis show, become acquainted with the accessories and equipment offerings as well as the motor vehicles. On returning home they will be in a position to go into their own local shows and use the information obtained in the state show, to make their local show a real opening for a spring selling campaign.

It is probable that Al Reeves of the N. A. C. C. will address the Indianapolis meeting March 4. Ray Sherman, merchandising director of the A. E. A., is expected to present the sales promotion plan to that meeting. Other similar meetings will be listed for dates in Richmond, Muncie, Logansport, Columbus, New Albany, in week following the Indianapolis show and preceding local shows. Back of this whole scheme is a supporting framework of direct-by-mail campaign by the jobber division, from the state association office to the automotive merchants, working on credit references, returned-goods troubles, and other angles of the relationship between jobber and retailer.

#### HOLYOKE WITHOUT SHOW

Holyoke, Mass., Feb. 19—At a meeting of the Holyoke Automotive Assn., Feb. 7, it was voted not to have a Holyoke automobile show this winter, because no large building can be obtained. It was voted to take space at the Springfield show instead, with the understanding that one day be designated as Holyoke Day. The used car situation was discussed and a committee appointed to draft a plan of control in co-operation *with other New England cities.*

## Flat Rate Service Plan Is The Ultimate Aim of GMC

### Adequate Consideration to Be Given Parts In Every Location, Is Corporations' Promise

NEW YORK, Feb. 17—Flat rates for service throughout all its divisions is the ultimate aim of the General Motors Corp. Accomplishment of this end is being approached as rapidly as possible. While nothing revolutionary is proposed, it is the determination of the corporation to give the users of its products the best service possible. To this end, standardization of practices is being extended gradually and the importance of keeping the owners of motor vehicles satisfied is being emphasized in the sales organization, both wholesale and retail. This extends to the parts question and includes the carrying of adequate stocks. The ultimate result will be that every owner of a General Motors vehicle, no matter where he may be located, will find spare parts easily accessible and they will be installed at a flat rate.

The service question has been neglected in the past, it is felt, because all the agencies of factory organizations were devoted to meeting the demand for cars. Factories now can easily turn out all the automobiles that can be sold and still give adequate consideration to the production of service parts. The sales organizations also have time to instruct dealers in some advanced business methods.

General Motors regards the outlook for the coming year as satisfactory. Business thus far this year has been far in excess of the same period in 1921 and sales are expected to expand as the year progresses. An increase has been apparent in the past two weeks.

The corporation has no expansion program in mind and all its operations will be on a conservative basis. The dissolution of the Scripps-Booth division is well under way and the manufacture of cars has been discontinued. No decision has been reached as to what disposition will be made of the factory, but it will be used in connection with some of the existing units.

Development work on the air-cooled line which the corporation will bring out is progressing satisfactorily, but not even an approximate date has been fixed for getting these models into production. The plans of the company concerning the new lines are as nebulous as they have been for several months and ample time will be given the engineering department to perfect the car before any attempt is made to put it on the market.

## Hawkeye Speeds Up; Buys a Buggy

*Traer, Iowa, Feb. 18—Cherveny & Dodd, implement dealers, have sold a new single buggy.*

*It was the first buggy sale in two or three years and in several years records do not show of over four. Not so many years ago dealers with a stock of less than 70 buggies were considered small and daily sales of three were not unusual.*

*Today's sale price was $110, not so much higher than a few years ago, when $90 was a fair price. With harness, horse and complete equipment, the outlay compares not unfavorably with a good low-priced car and this is the answer to the decline of the buggy business. Not so long ago the thrifty farmer bought a serviceable second-hand buggy to use on muddy days, but even this practice is passing.*

### OAKLAND IN CANADA

Oshawa, Ont., Feb. 19—Another unit of the General Motors of Canada, Ltd., is being organized. The new company will be known as the Oakland Motor Car Co. of Canada, Ltd., subsidiary of General Motors of Canada, Ltd. Operations will begin early in March and this will mean still more production for the Oshawa plants of General Motors, which are at present turning out more cars per day than at any previous time in their history.

Four body styles will be manufactured including a touring car, a roadster, a coupe, and a sedan. The car is slightly lighter in design than the McLaughlin-Buick six and somewhat lower in price.

## Credit Men Report Parts Business Best in Months

### They Think the Year's Sales Will Show Gradual Increase—Trade Expressions

NEW YORK, Feb. 17—More encouraging reports than have been heard in months were made by credit men of representative parts manufacturers at a group meeting recently. Almost without exception they declared business for January was greatly in excess of January, 1921, and that February is almost certain to be still better. They expect the first quarter at least to show a material gain, and it is the general belief that the year will be one of gradual but steady progress.

Most of the business at present is coming from manufacturers of the more popular lines of passenger cars, but many inquiries have been received recently from truck manufacturers and indications now are that the gains in the truck field later in the year will be more pronounced than in the motor car branch of the industry.

Following are paraphrases of some of the reports on business conditions made by representatives of large companies:

**"January business was the best for three months and February releases are four times as large as last month. Prospects for March are fair and we expect a steady improvement throughout the year."**

**"January was considerably better than a year ago and better than December. February releases are running much better. We believe that business will steadily improve."**

**"Our production now is from 70 per cent to 80 per cent of the peak reached in 1919."**

**"January was 50 per cent better than last year and 50 per cent of normal. We expect February to be nearly a normal month and are quite confident of the future."**

**"January releases were better than in December, and February will be better than January."**

**"January was three times better than**

DELEGATES TO FIFTH ANNUAL CONVENTION AUTOMOTIVE

last January and 15 per cent ahead of December. We look for a steady improvement up to April and expect to be operating at 50 per cent of capacity by that time."

"January was three times as good as last January and much ahead of November or December. February shows a considerable further improvement which we expect will continue. March promises to be better than February and April and May still better. We are running from 45 to 50 per cent capacity."

"We expect good business for the first four months of the year at least. January was away ahead of last January, while February, March and April look a lot better."

"January business was 300 per cent of last year and February will be better than January."

"Our production now is up to 45 per cent of capacity and orders now on the hook will make it 50 per cent."

"January was far ahead of the previous months."

### 50 TRUCKS DAY'S OUTPUT

Springfield, O., Feb. 18—With a 50-truck-a-day schedule now in full force at the Springfield works of the International Harvester Co. and shipments going forward about as rapidly as the machines are produced, the local plant is a busy place. Within the past week quite a number of men have been added to the force. C. H. Smart, superintendent, states that conditions are greatly improved. Cyrus H. McCormick, of Chicago, truck division manager, was at the Springfield works recently conferring with Smart.

### WARFORD IN NEW BERTH

Washington, Feb. 17—L. E. Warford, formerly field representative of the American Automobile Assn., has been assigned to the Automotive Division of the Bureau of Foreign and Domestic Commerce for the purpose of obtaining foreign data and other information of value to the automobile industry. He appears as a special agent for the National Automobile Chamber of Commerce and will assist Gordon Lee, Chief of the Division. Warford is a resident of Seattle, Wash.

## Ford Plans $1000 Trinity—Truck-Tractor-Automobile

### Tells Government That He Would Make Parts at Muscle Shoals Plants

WASHINGTON, Feb. 20—Henry Ford is attempting to lower his production costs so that he can sell farmers a Ford automobile, tractor and truck, all for $1000, according to testimony given by General Beach, chief of the corps of engineers of the United States army, who appeared before the House committee on military affairs, which is investigating the offer of Ford to take over the government property at Muscle Shoals. The present price of the three is $1173.

"Mr. Ford has said that he hopes to be able to cut the production costs of his machines to such a price that farmers can buy an automobile, a tractor and a truck for $1000," General Beach said. "I have every reason to believe that he aspires to go down in history as the man who did the most to develop the agricultural resources of his country and the agricultural possibilities of the world."

W. D. Mayo, chief engineer of the Ford company, testified that it is the intention of Ford to operate plant No. 1 at Muscle Shoals for the manufacture of automobile and tractor parts from raw materials. Ford hopes to be able to reduce the costs of raw materials, Mayo said.

"That has been his dream for some years past," he declared.

This testimony was construed to imply that Ford would produce light metals, possibly aluminum, which would enter into the construction of his automobile, but Mayo did not commit himself definitely as to production plans. He confined his testimony wherever possible to the manufacture of fertilizers and the development of plans for Muscle Shoals plants and power stations.

It was made clear by Mayo that Ford intends to use all the horsepower developed and will not sell power to private or public concerns unless it becomes evident there will be a surplus.

Senator Norris, of Nebraska, said he would call Ford personally to appear before the Senate agricultural committee, of which he is chairman and which began hearings on the Muscle Shoals project Feb. 14. It is expected Ford will accept the invitation.

Southern senators and representatives are very active in their efforts to obtain the approval of Congress for the Ford contract.

## Chevrolet Enters Six Cars To Win Indianapolis Race

Indianapolis, Feb. 18—Louis Chevrolet is out for a third victory at Indianapolis in 1922. "Grandpa" Chevrolet, as the veteran driver-engineer is known in racing circles, has made six entries for the tenth annual 500-mile race May 30. He will have his famous Frontenacs at the tape on May 30, four of the six will have four cylindered engines and the remaining two will have eight cylinder power plants. One of the fours will be the car that his baby brother, the late Gaston Chevrolet, drove to victory in 1920, while one of the eights will be the car which Speed King Tommy Milton used to win the 1921 five hundred. Milton's victory in the Indianapolis race made it possible for the speed king to also annex the 1921 A. A. A. contest board championship, gaining 1000 of his 2230 points in the Indianapolis drive.

### COAST FREIGHT RATES

New York, Feb. 19—Reports received by the traffic department of the National Automobile Chamber of Commerce indicate strongly that there will be no increase in the minimum car load weights on shipments of passenger cars and trucks to Pacific coast points.

### A. E. A. CATALOG IN MARCH

Chicago, Feb. 20—The Universal Catalogue, the work of the Automotive Equipment Assn., and which has been in preparation for several months, has gone over the top in fine style. There are 661 pages in the catalog representing 214 A. E. A. members. The association hopes to have the work in the hands of the trade by March 15. It is expected that the book will eventually become the hand book of the purchasing agent, the salesman, the sales manager and the trade generally.

RETAILERS OF ONTARIO, SNAPPED AT TORONTO, ONTARIO

## Used Car Situation Eases To Intense Dealer Effort

### Factories No Longer Consider Number On Hands Obstacle to New Vehicle Sales

DETROIT, Feb. 18—The used car situation is regarded by factory sales managers here as so well in hand that it is no longer necessary to regard it as a problem calling for specific factory aid. Stocks of used cars that were threatening to bring about a serious check to new car production are reported steadily disappearing under intelligent merchandising methods.

Much of this clarified situation has been brought about through the agency of the factory territorial man who has been employed to a large extent by all companies in the past few months in forcing used car action. Under his direction the disproportionate used car inventories are rapidly being brought down to proportions warranted by the extent of the business.

Dealers are co-operating to the utmost in working off the incubus. Special sales and salesmen are the order of the day in all parts of the country and so much has been accomplished already through these means that special factory plans for advertising, etc., have been abandoned except in one or two instances, in favor of the territorial man plan.

The principal argument in favor of this is that different localities require different methods, and the man on the spot is best equipped to help decide these. Where there is an opportunity for sales among foreign classes, men speaking the necessary languages have been employed to reach them with the used car opportunities.

Low priced sale and lengthy credit terms have been important in deflating the used car stocks, together with the guarantee of the dealer that the car would perform up to certain standards.

Throughout the situation the dealer has been impressed with the necessity of selling the new car better, so that where trade-ins were involved, the prospect would not bargain too much for allowances on the exchanged vehicle.

#### ALLEN PLANT SALE CANCELLED

Columbus, O., Feb. 19—The deal for the sale of the plant and tangible assets of the Allen Motor Co., which has been in the hands of George A. Archer and W. C. Willard, as receivers, for more than six months, to Frank P. Shaw, of Chicago, has been declared off. Shaw made a bid of $570,000 for the plant and assets, excepting cash on hand and bills receivable and this was accepted by Judge Sater in the Federal court. Later it developed that he could not carry out the deal.

H. C. Runyon, who has personal charge of the assets under the receivers, reports two offers for the plant. One of them provides for immediate liquidation, while the other looks towards the continuation of the plant as a going concern. Neither have been accepted so far and creditors will likely be called together to learn their desires. In the meantime, the plant is giving service to Allen car owners in Columbus and central Ohio.

## Large Sums in Year's Car Output

*Syracuse, N. Y., Feb. 18—Sales of the H. H. Franklin Manufacturing Co. during 1921 aggregated $22,280,000. During 1920—the peak year of the industry—Franklin sales also reached their peak—$27,864,000. Officials of the company point out that sales for 1921 exceeded the marks set up in 1917 and 1918 by $6,000,000 in each case, and come within approximately a million dollars of the 1919 mark.*

## South Carolina Would Class Automobiles With Perfumes

New York, Feb. 17—The Motor Vehicle Committee has been informed by Frank H. Gibbes, chairman of the South Carolina state sub-committee of the conference that the lower house of the state legislature has acted favorably on a measure which would impose a one per cent sales tax on motor vehicles. The provision is included in a measure to grant licenses "for the privilege of conducting a business involving trading in luxuries." Motor vehicles are mentioned specifically with candy, tobacco, perfumes, etc. It is expected the measure will go before the Senate next week.

The South Carolina Automobile Dealers' Assn. will make representations in opposition to the measure and it is expected that backing will be given by the National Automobile Dealers' Assn. At the request of Gibbes, the Motor Vehicle Conference Committee has sent out to South Carolina legislators and newspapers data demonstrating conclusively that motor vehicles are essential to transportation and cannot be classed as luxuries by any stretch of the imagination.

#### LOS ANGELES WANTS SHOW

Los Angeles, Feb. 17—Realizing that a show can be expected to improve buying conditions, the board of directors of the Motor Car Dealers Assn. has recommended to the association that a show be held the second week in March. This is advancing the tentative date for the event by one month. There has been considerable agitation of the show question for several weeks and the action of the directors undoubtedly has been influenced by this. Some dealers have maintained that a mistake was made in not having a mid-winter show or at a time when show interest was general throughout the country.

## Commission Aims to Destroy Old Market for Stolen Cars

### Will Co-Ordinate Efforts of Police, Insurance and Others in Organization

CHICAGO, Feb. 17—Organized to give service and effect co-operation and not to sell service, the Interstate Motor Theft Commission, chartered under the laws of Illinois, has established headquarters in Chicago, where it hopes to furnish a national clearance test to be applied to all cars registered in the United States as a means of co-ordinating the efforts of police departments, insurance companies and others, in reducing the theft of automobiles, recovering stolen cars and prosecuting the thieves.

The commission, which is fashioned something after the style of the Chicago Crime Commission, is governed by a board of seven, assisted by national advisory boards composed of police officials, insurance men and business executives. Joseph A. Farout, deputy police commissioner of New York; Charles W. Peters, sheriff of Cook county, Ill.; Dan Beard, national Boy Scout commissioner; J. A. Hall, educational director of the Associated Advertising Clubs of the World; Gutzon Berglum, president of the International Sporting Club; E. M. Allen, member of the insurance committee of the United States Chamber of Commerce, and Harvey G. Badgerow, president of the Illinois Insurance Federation, are members of the advisory committees.

The commission will endeavor to keep itself going through fees from memberships. It will not sell abstracts of title nor recovery service. Any service that may be rendered any member is wholly secondary to the main issue, which is to establish a national clearance bureau for the free use of law enforcement bodies. Co-operation is asked from all kindred organizations and every effort will be made to aid in destroying the stolen car market.

This organization was decided upon after a year's study of the situation and conference with leading officials, insurance representatives and business heads closely associated with the automobile industry.

#### NAMES LOCOMOBILE RECEIVERS

Philadelphia, Pa., Feb. 18—Federal Judge Dickinson has appointed Elmer H. Havens, president of the Locomobile Co., and William S. Horner, local general manager, as ancillary receivers for the Locomobile Co. of America to take charge of assets here pending the proposed reorganization of the company. Bonds were fixed at $10,000. The assets here are estimated at $50,000. The receivers will continue business until the courts further order. A reorganization plan is under way.

# IN THE RETAIL FIELD

**Pattison-Eimiller Co., Inc.,** automobile sales agency and service station at Niagara Falls, filed a voluntary bankruptcy petition here listing assets of $15,243 and liabilities of $31,130.

**Parker and Deetz,** Haynes and Scripps-Booth dealers, have added the Dort car to their line. They have not only Decatur, Ill., but adjacent territory. The Scripps-Booth agency for the year was not renewed. Full line of Dorts will be on the floor before the spring season gets under way.

**James D. Hazlett** has withdrawn his interests in the Hazlett Bros. Galesburg agency, representing the Hupmobile, and will represent the Gardner car in this territory.

**William Frede & Son** have opened a Chevrolet agency in the rooms formerly occupied by the Guy C. Ferre Dodge agency. The new firm has handled Chevrolet cars six years in Stewardson and is making its entry in the Decatur, Ill., field.

**Pierce-Arrow Sales Co.,** Buffalo, has purchased a building site this summer, according to an official statement.

**Walter S. Cassidy** has opened a building for the sale of Hudson and Essex cars in Greenfield, Mass., with service station attached. C. A. Griffin is in charge.

**Carroll-Thompson Co.,** Columbus, Ohio, has taken over the Chevrolet line of cars, instead of dealing in the Ford line as it has been doing for about five years. The company, however, will continue to give service to Ford owners. This gives to agencies in Columbus as the Winders Motor Sales Co., is distributor for the same line.

**B. H. Kennedy Co.** begins business as a direct factory dealer in touch with the Studebaker branch plant at Portland, Ore.

**W. R. DeLay Motor Co.,** Portland, Ore., Peerless and Velie distributors, will move into its new location this week.

**Blue Ribbon Motor Sales Co.,** Springfield, Mass., has taken the agency of the Gardner car for Hampden and Hampshire counties.

**Girard Motor Co.** has moved into its new building in Northampton, Mass. It is fireproof throughout, the exterior being mainly of tapestry brick. Three sides of the showroom are almost wholly of glass. There is a large service station in connection.

**J. W. Duntley Co.** has been taken over by the brother of J. W. Duntley and is now known as the O. W. Duntley Company, and is located at Chicago. J. W. Duntley was killed about two months ago.

**Selleck, Persons & Co.** were incorporated at Buffalo for $10,000 to deal in automobile accessories. The incorporators are Robert H. Persons of East Aurora and Alfred T. Irwin, Melville C. Selleck, Harry Scheu and Charles F. Blair of Buffalo.

**Wire Wheel Corp.,** having outgrown its former limited Chicago location, has opened up new headquarters in that city.

**B. E. Annis** has been appointed by the Norcross-Cameron Co., as a sub-agent for Maxwell and Chalmers cars in Greenfield, Mass.

**Cohen & Haymond** will open a large store for their used car business in Springfield, Mass., March 1.

**The Columbus-Stutz Co.** has been made Columbus and central Ohio distributor for the Rickenbacker line of cars. Eddie Rickenbacker, who is one of the leading citizens of Columbus, attended the annual automobile show, where his

With **Dr. R. N. Forbes** as president, Charles Chew as vice-president, and Shirley Vincent as secretary-treasurer, the Olean Automobile Dealers' association has been formed. The permanent organization is the result of an automobile show held in Olean (N. Y.) early in February.

**Westfield Auto Supply Co.,** a new automobile supply and accessory store, has been opened at Westfield, N. Y., by Rudolph and R. E. Fleck.

**General Motors Co.,** following the purchase of the Southeastern GMC Co., has opened a direct branch at Atlanta with T. K. Johnson as manager. A complete stock of parts and trucks will be carried.

**Penny-Busick Co.,** Greeneville, S. C., Ford dealers, have erected a large building which they will use for headquarters.

**James C. Tate** and **A. C. Chandler** have contracted for the Liberty agency in New England.

**Gamble Mottor Car Co.,** Toledo, has secured the agency for the La Fayette in Toledo and 12 counties in northwestern Ohio.

**Arthur C. Pfanschmidt** and **Elmer C. Geisel** have formed partnership to distribute tractors in the Quincy, Ill., territory, and already have agency for Parrett, Twin City and Samson tractors and Samson trucks.

**Clough-Reihm** tire agency, Quincy, Ill., which recently disposed of its Springfield, Ill., branch to E. C. Whitaker and George S. Malone, has enlarged its Quincy offices and is adding Mason tires to its stock. The company has the Firestone agency, too.

**Charles Hiller,** Galesburg, Ill., has opened a tire and accessory store and will also handle vulcanizing, manufacture tops and side curtains for motor vehicles, and also handle oils and other supplies.

**Miller & Plowman,** garage, Freeport, Ill., has been consolidated with the Illinois Motor Works and the joint plant will carry the latter name. George Deininger has purchased the interest of J. E. Miller, who retires.

**Howard Frazier,** Rantoul, Ill., has purchased a building and will remodel it into an uptodate garage and sales agency. He will open the plant for business about March 1.

**R. C. Jasper,** Moline, Ill., has opened a garage and sales agency. He will distribute the Gardner car in that territory.

**Henry Beitz** and **Charles Meyers** have formed a partnership and opened a garage at Peoria, Ill. They will specialize in battery service.

**Max Opperman,** garage, Batavia, Ill., was closed upon a chattel mortgage held by the former owner, C. M. Anderson, who will again operate the plant.

**Philip G.** and **Sam V. Heend** have established the Clinton (Ia.) Auto Parts Co., handling all makes of standard replacement parts.

**S. M. W. Auto Supply Co.,** Springfield, Ill., has been organized by W. M. Stowell, E. C. Whittaker, and A. W. Mills, and has opened an accessory store.

**Auto Illinois Inn,** Springfield, Ill., has moved to a new location, the old quarters having been outgrown; B. G. Sutton is proprietor.

**W. H. Stevens,** Boston, who handles Earl and National, and who was joined recently by James C. Clarke, formerly sales manager of the National at Indianapolis, have secured the Rickenbacker for New England.

**Haggerty & Fleer** now occupy new quarters at Quincy, Ill., with exclusive agency for the Kelly-Springfield tires. Organized two years ago, the firm has become one of the city's cost modernly equipped stations.

**O'Brien Motor Tire Co.,** opened a store at Toledo last week. They will carry a line of standard truck and auto tires. L. R. McNall will have charge of the truck tire department.

**Hudson and Essex dealers** of Western New England, had a quarterly meeting in Hotel Draper, Northampton, Feb. 9. The new quarters of the F. C. Magrannis were inspected.

## COLUMBIA SIX IN MARCH

Detroit, Feb. 18—The Columbia Six, which was privately shown to dealers at the Chicago show and which will retail at $985 f.o.b. Detroit, will be in production in March, according to officials of the Columbia company. The production schedule, according to Walter L. Daly, vice president, will be 75 for March, 400 for April, 750 for May and 1000 for June.

## DEALERS' TAX REFUND

Toronto, Ont., Feb. 19—Automobile dealers in the Province of Ontario expect to meet success in their efforts to obtain from the Dominion Government a refund of the money collected from them as a luxury tax on their cars in stock between 1918 and 1920. The committee which had been taking the question up at Ottawa reported a very favorable progress at a recent session of the Ontario retailers' association.

# Central Ohio Dealers Find Sales Increase After Show

### Cars Under $1600 Are Most Popular—Truck Business Slow Except Delivery Vehicles

COLUMBUS, Ohio, Feb. 20—Demand for passenger cars in Columbus and central Ohio territory is increasing noticeably. Dealers in Columbus, following the very successful show, report a larger business with prospects more easily handled. Quite a few sales of cars have been made, both for immediate delivery and for delivery in March and April. The tone of the trade shows a decided improvement in many ways and optimism is taking the place of pessimism in the ranks of the dealer and distributor.

The public is coming to a realization that prices are now pretty well stabilized and are coming into the market as a result. Cars selling from $850 to $1600 are the most popular at this time, although frequent sales of higher priced cars are reported. In farming sections there is a growing disposition to buy.

Distributors in Columbus are now stocking up for the spring business and quite a few cars have been placed in storage. Dealers are busy looking up their prospects secured at the automobile show and through other sources.

Truck business is still low, although there are signs of improvement. The demand for light delivery wagons is the best and far in excess of that for the heavier lines of trucks.

## OHIO ASSOCIATION ELECTS

Columbus, O., Feb. 20—Y. B. Jones, president of the Ohio Automotive Trade Assn., announces the appointment of standing committees as follows: Executive committee, J. B. Jones, chairman, Charles B. Ratterman, O. L. DeWeese, E. D. Sutton and C. C. Welker; membership committee, E. C. Brisley, chairman, W. E. Griffith and H. G. Wiley; legislative committee, T. R. Dahl, chairman, Jay I. Sharpe and Y. B. Jones; manufacturers' relations committee, H. G. Wiley, chairman, Leo J. Collier and Charles B. Rattermann.

E. J. Shover, who has been secretary and manager for several years, will continue in that position for the coming year.

## JEWETT SEDAN PRODUCTION

Detroit, Feb. 19—The Jewett sedan, all metal and with four doors, will be in production within the next 90 days. It is expected to sell for $1395.

## CHICAGO USED CAR SHOW

Chicago, Feb. 18—Chicago dealers will give a used car show in the Coliseum April 26 to May 4. The show will be given under the direction of the Chicago Automotive Trades Assn. Every car on exhibit will bear the guarantee of the dealers' association.

# CONCERNING MEN YOU KNOW

**Arthur T. Stanton,** identified with the motor car industry for seventeen years, and for eight years associated with Dodge Brothers, has joined the executive staff of the Maxwell-Chalmers organization as director of service.

**George C. Morgan,** assistant general sales manager of Earl Motors Inc., has been promoted to general sales manager, succeeding Kelly R. Jacoby. D. Minard Shaw, advertising chief of the company, has succeeded to the post of assistant general sales manager, which he will couple up with his advertising work.

**C. S. Mott,** vice-president of the General Motors Corp., Flint, Mich., has been elected president of the Flint Y. M. C. A. by the new board of directors.

**W. M. Jones,** who has been secretary of the Charlotte, N. C., Automotive Trades' Assn. for about two years, and of the Carolina Automotive Trades Assn. for a year, has resigned both positions to enter the life insurance field.

**Carl Velguth,** for many years secretary and sales manager of the John Obenberger Drop Forge Co., has organized a new company which is to be located at Milwaukee, it has been learned during the past week. It will be known as "Velguth Metal Parts."

**George Frank Lord,** prominent in advertising work and associated with a number of nationally prominent concerns, has lately been appointed advertising manager of Chevrolet Motor Co.

**Jerry Price** resigned as works manager of the Willys-Overland Co., this week on account of ill health. Price has been at the Toledo plant for about two years.

**R. S. Jemison,** formerly advertising manager of the Oldfield Tire Co., Akron, has joined the forces of the United States Advertising Corp. at Toledo.

**O. E. Dunlap,** of Ferris Dunlap Auto Supply Co., Dallas, Tex., was killed in an automobile collision.

**J. E. Roberts** has been appointed western sales manager for the Rolls Royce.

**E. E. Warfield** has been appointed sales manager of the Gill Mfg. Co., Chicago.

**Gilbert U. Radoye,** director of advertising of Haynes Automobile Co., Kokomo, Ind., has been appointed to the position of director of sales promotion, according to announcement by Alton G. Seiberling, vice-president and general manager.

**Harry J. Failor** has been appointed manager of the used car department for Harper & Harper, dealer in Handley-Knight and Willys-Knight cars in the Philadelphia territory.

**A. W. Sawyer,** advertising manager of the Hart-Parr Co., Charles City, Iowa, has accepted a position with Cramer-Krasselt Co., of Milwaukee, Wis., and will assume his duties with that company in about ten days.

**W. J. Rennick** has just been made secretary and treasurer of McKone Tire & Rubber Co., Millersburg, O. Rennick's appointment means the removal of the offices of the McKone company from Chicago to its factory at Millersburg, where all general business will be transacted.

**Fred M. Lyon,** vice-president of the Chanslor Lyon Co., is dead at his Texas home.

**George C. Diehl,** president of the American Automobile Association, was the principal speaker at the annual meeting of the Chicago Motor Club, Tuesday evening, Feb. 21, at the Coliseum.

**J. H. Callahan,** Portland, Ore., holds first place among the Mason tire salesmen throughout the entire United States in the sale of solid tires, for that company.

**The Willys-Overland Pacific** organization will return Frank C. Riggs, former Portland automobile dealer, back home as manager of the Willys-Overland Pacific Company in Portland, with general supervision over the northwest territory, and will take Harry C. Hays to Seattle, Wash., as head of the Overland branch there. **Ernest N. Culver,** who has been assistant sales manager of the Company at Toledo, O., will hereafter assume the position as Pacific Coast manager of the Company, with headquarters in San Francisco.

**Fred H. Caley,** secretary of the Cleveland Automobile Club, has arrived in Mexico City, where he went at the invitation of the automobile dealers and will remain until March 1, assisting the automotive department of the Chamber of Commerce in preparing for the automobile show which will be held there from April 16 to 23.

**Sterling Elliott,** inventor of a type of automobile steering gear, died at his home, in Newton, Mass., Feb. 13, at the age of 70 years. At the time of his death he was president of the Elliott Addressing Machine Co.

**J. K. Watson,** of the Rutherford (N. J.) National Bank, has been elected president and treasurer of the re-organized Braender Rubber Tire Co. Other officers elected are: F. L. Braender, vice-president, in charge of purchase and production; W. P. Braender, vice-president in charge of sales; M. E. Morris, vice-president and general manager; Milton Damman, secretary, and Harry Braender, assistant secretary.

**Paul Knoll** has been appointed branch manager of the J. I. Case Plow Works at Minneapolis, succeeding M. Schibsby, resigned.

## PULLMAN STARTS BODY WORKS

Chicago, Feb. 17—Starting March 1 the Pullman Co. will begin a schedule of 600 Packard automobile bodies a month. The company has maintained a Packard department for some time but its operation has been sluggish for several months.

## WATCH FOR THIS SWINDLER

Chicago, Feb. 19—Recently there have been received by MOTOR AGE several complaints of a swindler who is operating in southern sections of the country as an expert in marketing used cars. Some times this man operates independently and sometimes he presents himself as a representative of the Tom Jones Co., sales engineers. The latter company has made it plain that it employs no traveling solicitors but always approaches a prospect by mail.

This man sometimes gives the name of Culvert and at times a name similar to that. These complaints have been forwarded to MOTOR AGE because this publication some time ago printed an editorial which carried an impersonal warning against such a swindler. Naturally it is found that this man has no ability as a used car salesman, to judge by results, where he has stuck on the job in an attempt to carry it through. This man was last heard from in Louisiana.

## H. G. ROOT LEAVES WESTCOTT

Springfield, Ohio, Feb. 18—Following the annual meeting of the Westcott Motor Car Co., announcement was made by Pres. B. J. Westcott that H. G. Root had tendered his resignation as general manager, effective March 1, and that Root would after that date devote his entire time to the H. G. Root Co. and the Automotive Parts Co. Root has been general manager of the Westcott Co. since 1914.

President Westcott also announced that the motor car plant would be operated to capacity for several months as a result of business in sight. Officers elected by the Westcott Co. are: President, B. J. Westcott; vice president, E. H. Gilcrest; secretary and treasurer, J. M. Rehe. Gilcrest is sales manager.

# Ford Tells How He Fixes New Prices On 1,000,000 Cars

## Works Backward From Value Set and Makes Everything Meet Desired Figures

CHICAGO, Feb. 18—In a signed article in the March number of System, Henry Ford tells how he is able to maintain steady profits in his manufacturing interests. Among other things, he says:

**1. Am I able to make what the people want, make it better than anyone else?**

**2. What price can the consumer afford to pay?**

**3. Can I trust myself to remain faithful to my principles?**

This is not illogical; it is simply keeping in mind that the consumer is going to control the business and you therefore accept his control first instead of last. The public wants a definite number of things. I spent 12 years, day and night, at the drawing board and in the shop before I knew that I could make something which the people would want.

**The price of no Ford product has ever been made on what it ought to cost to manufacture that product. We have always taken the price and worked back. Every price has been a challenge to ourselves. It has always been below the lowest cost we could figure out in advance.** Then we have gone ahead with that price hanging over us and found so many new, better and less expensive ways of doing things that the price which once, under the ordinary method of calculation, would have been considered impossible, became very profitable.

When this year we cut the price of cars we cut them below our cost figures of production and for about a month we sold at a loss. But of course we caught up on our own price. We found ways and means of cutting expenses that made the losing price a very profitable one. **I am quite certain that if instead of estimating what the consumer would pay and pricing accordingly, we had taken our costs and found the lowest price we could sell at, our business would today be dull instead of being better and more profitable than it has ever been.**

## TEMPLAR SUIT AGAIN HALTED

Columbus, Ohio, Feb. 18—The case of N. Clyburn against the Templar Motors Co. and its board of directors, praying for a receiver, which has been pending in the Franklin County courts for some time, was again postponed when it came up for hearing recently until Feb. 20.

In the meantime Attorney F. S. Monnett, representing the plaintiff, will take depositions on the merits of the case in order to aid the court in arriving at a decision. Stockholders of the company in Columbus have received notices of the annual stockholders' meeting, which will be held at Lakewood, O., March 1.

# BUSINESS NOTES

**Wright-Hibbard Motor Truck Co.**, Buffalo, has taken a 30-day option on the plant of the Collins Iron Works at Phels, N. Y., and is planning to begin production in the near future, it is reported.

**Chevrolet Motor Co.**, Buffalo, has purchased a site and will erect a warehouse with 40,000 sq. ft. floor space. The site was purchased at a cost of $100,000. The warehouse will be used as a distributing center by the firm.

**Briggs & Stratton**, Milwaukee, are just about to enter production on a large scale of a new motor driven type of horn which will list at $5.

**Philadelphia Rubber Works Co.**, as plaintiff, after ten years of litigation in Federal court, over a patent infringment case, has just settled the case with the **U. S. Rubber Reclaiming Co.** and the **Madison Tire and Rubber Co.** A return filed here shows the Philadelphia company has been paid $350,096 by the defendants, in accordance with a verdict rendered in January, 1921.

**J. G. Brill Co.**, Philadelphia, manufacturers of motor truck and omnibus bodies, in addition to street cars, reports for 1921 a profit of $163,399, or 3.56 per cent on the $4,580,000 preferred stock, as against 7 per cent on the preferred stock and 22.7 per cent on the $4,810,200 common stock in 1920.

**Deere & Co.**, Moline, Ill., in its report for the year ended Dec. 31, 1921, reveals a loss from operations of $2,752.80 after taxes and amortization charges, but before allowance for inventory depreciation. The deficit for the year cut surplus from $17,237,487 to $2,034,686 after the payment of preferred dividends. The loss compares with net earnings in 1920 of $4,647,718. The balance sheet as of Oct. 31, 1921, showed total quick assets of $47,298,508, and total current liabilities of $9,985,494, exclusive of $10,000,000 ten-year notes, compared with quick assets of $56,605,258 and current liabilities of $22,520,696 a year previous before the issuance of $10,000,000 notes. Reserves for contingencies and depreciation was $7,722,500.

**American Motor Corp.'s** creditors have agreed to accept an offer of $200,000 for the personal property of the company made by syndicates headed by C. B. Penney of Greenboro, N. C.

**Mart-in-Nash Motors Co.** has been organized in Atlanta, Ga., to distribute Nash cars in the southeastern states, the new company being headed by Robert H. Martin, formerly president of the Georgia Automotive Dealers' Association. C. W. Nash, president of the Nash Motors Co., was in Atlanta and personally consummated the deal.

**R. & V. Motor Co.** has assumed control of the Ever-Ready Auto Co., Baltimore, Md., and reorganized it under the name of the R. & V. Motor Co. of Maryland. The concern is a sales and service organization. G. M. Watson, general manager, will continue in that capacity.

**Pacific Reliance Motor Corp.** has made arrangements to assemble the Reliance Truck in a plant of its own in addition to building a three-fourths ton truck for school and bus trade. Several of these light trucks already have been delivered. One is in service between Somerton and Yuma, Ariz. These activities will be in addition to the sale of Reliance trucks in the western territory.

**Robert M. Feustel & Chas. O. Roemler**, of Indianapolis, receivers for the Spacke Machine and Tool Co., of Indianapolis, are advertising for bids for receivers' sale of the assets of Spacke Machine, which includes the Spacke automobile and axle factories, machinery, equipment, inventory and accessories.

**Racine Auto Tire Co.**, Racine, Wis., filed a voluntary petition in bankruptcy in the Federal court at Milwaukee, scheduling its liabilities at $1,453,216.22 and its assets at $1,642,836.22.

**Eddylite Spark Plug Co.**, Buffalo, has been incorporated for $100,000 by William F. Feser of Olean, Lyman J. Eddy of Strykersville and Clarence B. Eddy of Wales Center.

**John Obenberger Forge Co.**, of West Allis, suburb of Milwaukee, entire assets will be offered for sale at public auction on March 1, in Milwaukee, by J. Frank Gerdis, trustee in bankruptcy.

**Ty Cobb Tire Co.**, Augusta, Ga., a dealer organization formed and largely owned by Tyrus Raymond Cobb, premier star of the diamond, about two years ago, has filed a voluntary petition in bankruptcy. Liabilities are $37,423.27, with assets at $21,466.72. Cobb took an active interest in the business during the winter months he spent at his home in Augusta.

**Racine Auto Tire Co.** has been ordered into immediate factory operations by the court that recently granted request for voluntary petition in bankruptcy. Bankruptcy proceedings were considered the best methods of reorganizing the company and straightening out its affairs.

**Cotta Transmission Corp.**, reorganized, has been granted a charter showing capital stock of $750,000. B. W. Maguire holds $90,000 stock; T. E. Swords, $60,000 and John H. Camlin, Frank G. Hogland, Charles Shanhouse, A. C. Woods, C. E. Woodward and Stanton A. Hyer, each $35,000.

**Crow-Elkhart Motor Corp.** has gone into the hands of the receiver.

**Philadelphia Automobile Accessories Business Ass'n** has started a campaign to raise funds for a building to be owned and used by the organization.

**Sparks Withington Co.**, Jackson, Mich., manufacturers of the Sparton system, will retire from the manufacture of vacuum systems and surrender their patents to the Stewart-Warner Corp., according to a statement by the latter company.

## Crow-Elkhart Attorney Says Reorganization Impossible

Elkhart, Ind., Feb. 20—E. A. Skinner, attorney for Crow-Elkhart Motor Corp., for which former Mayor William E. Wider has been appointed receiver, said there was hardly a possibility of any attempt at reorganization. The corporation's assets he estimated at between $300,000 and $350,000 and its liabilities at $750,000. Wider said he was unable to give a detailed statement of assets and liabilities, as he had not yet begun the active work of digging into the concern's affairs.

The corporation's assets consist of grounds and buildings here, materials and finished stock on hand. The liabilities consist of a $60,000 bond mortgage and accounts payable aggregating $150,000. Attorney Skinner said there probably were 3400 stockholders scattered throughout the country and there were no large individual creditors besides bondholders and owners of stock, possibly none having claims exceeding $2500. These creditors, he also said, were widely scattered.

### HIGHWAY ROUTES IMPORTANT

Washington, Feb. 17—One of the great transportation problems confronting the country at present relates to the development of motor transport and transportation, in the opinion of A. C. Bedford, chairman of the board of the Standard Oil Co. of New Jersey, who addressed the National Council of the Chamber of Commerce of the United States. He declared the highway transportation involved the vital problem of co-ordinating motor trucks for short haul work with steam lines. He asserted that highway transportation was in its infancy and that great care should be exercised in laying out highway routes for this important traffic movement.

## Show Sales Spurt Wheels In Parts Makers' Factories

### Orders Have Been On Increase Since First of Year—Outlook Seems Bright

CLEVELAND, Feb. 20—Buying that was started by the automobile show has brought increasing orders into the offices of manufacturers here who make automobile parts and accessories.

The making of automobile parts is this city's largest industry and orders have been coming in lately at about the rate which has prevailed since Jan. 10 or with a slight improvement in some instances, according to reports received at the offices.

There was a spurt in orders just after the opening of the new year, and business has continued since on the level that was then established.

Makers of parts and accessories say that never within their history has buying been done so closely by automobile makers as is the case at present. Orders placed carry provisions for speed in delivery.

Steel makers assert that the automobile industry is doing more than any other single line to put back the fires in the steel mills.

Orders have been much better in January and February than in several preceding months, but they are not normal, according to executives at the plant of the **Willard Battery Co.** At this plant they are looking for a general increase up to the middle of June. Other statements follow:

**Grant-Lees Gear Co.**—Planning to work on capacity basis on orders that are sufficient to keep the company going the entire year.

**Sherwin-Williams Co.**—(Paints)—The business in the automobile parts department is better than in any other section of the institution. The volume is better than it was at the same time a year ago.

**Columbus Axle Co.**—There has not been much change in this factory since about Jan. 10, when orders picked up. Steady improvement expected until the middle of June.

**Interstate Foundry Co.**—This factory is now working six days a week instead of five days, as was the case two weeks ago. Before that the men were employed only three days a week. The outlook is good for the men to continue on the six days a week schedule.

**National Acme Mfg. Co.**—There has been a considerable improvement in the demand for automatic machines. Outlook is good for continued upturn.

**K-W Ignition Co.**—The demand is better than it was two weeks ago and a gradual increase is expected until June. Jobbers' stocks are low.

**Ohio Body-Blower Co.**—The automobile business is now taking about 25 per cent of the plant's total, compared to the usual 60 per cent.

# The READERS' CLEARING HOUSE

## Questions & Answers on Dealers' Problems

## Procedure for Obtaining a Patent

Q—Explain manner of procedure in obtaining a patent.—C. Grimes, Newark, Ark.

The rules of practice of the U. S. Patent Office advise any applicant for a patent, that unless he is familiar with such matters, to employ a competent patent attorney, as the value of patents depends largely upon the skillful preparation of the specification and claims.

It is further stated that a patent may be obtained by any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement thereof, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application, and not patented in a country foreign to the United States or an application filed by him more than twelve months before his application, and not in public use or on sale in the United States for more than two years prior to his application, unless the same is proved to have been abandoned, upon payment of the fees required by law and other due proceedings.

Applications for letters patent of the United States must be made to the commissioner of patents, and must be signed by the inventor or his legal representative. A complete application comprises the first fee of $15, a petition, specification, and oath, and drawings when required. The completed application is given a serial number.

The petition must be addressed to the commissioner of patents, and must state the name, residence and postoffice address of the petitioner desiring the patent, designate by title the invention sought to be patented, contain a reference to the specification for a full disclosure of such invention, and must be signed by the inventor or his legal representative.

The specification is a written description of the invention or discovery and of the manner and process of making, constructing, compounding, and using the same, and is required to be in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which the invention or discovery appertains or with which it is most nearly connected, to make, construct, compound and use the same.

The specification must set forth the precise invention for which a patent is solicited, and explain the principle thereof, and the best mode in which the applicant has contemplated applying that principle, in such manner as to distinguish it from other inventions.

**In Case of a Mere Improvement,** the specification must particularly point out the parts to which the improvement relates, and must by explicit language distinguish between what is old and what is claimed as new, and the description and the drawings, as well as the claims, should be confined to the specific improvement and such parts as necessarily co-operate with it.

**Claims**—The specification must conclude with a specific and distinct claim or claims of the part, improvement or combination which the applicant regards as his invention or discovery.

These are fundamental principles that must be observed in applying for a patent. Many details are connected with any particular application. Even after a patent is granted it requires court decisions thereon to absolutely determine its validity.

### *The Readers' Clearing House*

*THIS department is conducted to assist dealers and service station executives in the solution of their problems.*

*In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.*

*Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.*

*Addresses of business firms will not be published in this department but will be supplied by letter.*

*Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions, by MOTOR AGE organization in conference.*

### POSTING SIGN DOES NOT EXCUSE RESPONSIBILITY

Q—Will you kindly publish in your paper an answer to the following questions? A public garage in a nearby town has been destroyed by fire, and the owners of the cars destroyed are trying to hold the owner of the garage responsible regardless of the fact that he had signs posted, "Not responsible in case of fire." Is it possible for them to do this under the laws of Illinois? Must we give bond to run a public garage for storage?—Logan & Vanderheyden, Elizabeth, Ill.

Posting of signs "Not responsible in case of fire" does not relieve a garageman from responsibility for his negligence causing a fire.

Under the recent statute regulating the storage of personal property for hire, one must give bond for operating a public garage for storage. This bond may not be less than $5,000. Also a license to do business is required and this fee is $25.

### IMPOSSIBLE TO REMOVE EFFECTS OF BODY WAX

Q—We are troubled with wax on Hudson turning white and would like to remove it if possible. Is there any solution that would remove it? If so, advise where I can purchase same. — Main Garage, Schererville, Ind.

It is impossible to remove this wax by any preparation. The wax has caused a chemical action and has decomposed certain of the elements of the finish of the car. It would be necessary to pummy the white off and revarnish the car. Great care should be exercised in using pumice on the finish so as not to go through any farther than is necessary. Use pumice just enough to remove the white and then give the car a coat of color varnish. If pumice will not remove this white that you speak of it will be necessary to burn all of the paint off and repaint the car.

### BATTERY CHARGING

Q—How many Mazda lamps are installed in a lampbank resistance to properly charge a battery for Paige touring car? This is on a Farm Lighting Plant of 32 volts.—J. D. Belk, Hoxie, Ark.

A 32-volt Mazda lamp will draw approximately one ampere. It depends entirely on what charging rate you want to give this battery. If started off at seven amperes approximately seven lamps will be required. However, these figures are only approximate and experiment will give more accurate results.

### SERIAL NUMBERS OF OVERLAND CAR

Q—Give the engine and car number of the last car made in 1921 of the Overland fours, or the first car and engine number of the 1922 series.—W. J. Behling, Oshkosh, Wis.

The serial number of the last Overland car made in 1921 was 164819, and the serial number of the first car made in 1922 was 164820. Please note that there is no new 1922 series and that the last car made in 1921 and the first one made in 1922 are exactly alike. The engine numbers are not available.

### WIRING DIAGRAM FOR STUDEBAKER

Q—Supply wiring diagram for model S. D. 4 Studebaker, 1915. Could I change this into a grounded system?—Ira S. Tobey, Sheboygan, Wis.

This conversion to a single wire system would entail considerable expense. It would virtually require an entire rewiring of the system and it is doubtful whether the cost of the revision would justify the advantages gained unless the present wiring is in poor condition. The wiring diagram requested is shown at the right.

### COLLECTION OF MISCELLANEOUS INFORMATION

Q—Does a dealer have to buy his demonstrating cars, or does the manufacturer supply them?

2—If the manufacturer supplies them, how many models is the dealer allowed?

3—What size Gabriel snubbers should be used on a four cylinder Buick sedan?

4—What generator regulation is used on the Fox air-cooled car, and do they use a dual ignition system?—Howard C. Waitz, Oil City, Pa.

1—Almost without exception the dealer buys the demonstrating cars. In some organizations the salesmen supply their own demonstrating cars.

2—Rarely if ever at all does the manufacturer supply a demonstrator to the dealer.

3—Although you do not state the year model we presume you refer to the new series Buick fours. The new series four cylinder Buick requires a No. 2 Standard Gabriel snubber.

4—Complete specifications of the Fox car have not as yet been supplied us. The electrical system consists of Westinghouse motor and generator, Exide battery and Bosch magneto.

### ANOTHER INQUIRY ABOUT MYSTERY TALE NO. 109

Q—Supply solution to Mystery Tale No. 109.—H. E. Klunk, Hanover, Pa.

This solution appeared in the January 5, 1922, issue of MOTOR AGE.

### CONVERSION OF CHASSIS REQUIRES LARGE MONEY OUTLAY

Q—Advise whether a chain drive truck can be transformed into an internal drive. We have a Smith Form-A Truck power plant. Engine is almost new and would like to know how much it would cost to do this converting job.—S. C. Bogue, West Plains, Mo.

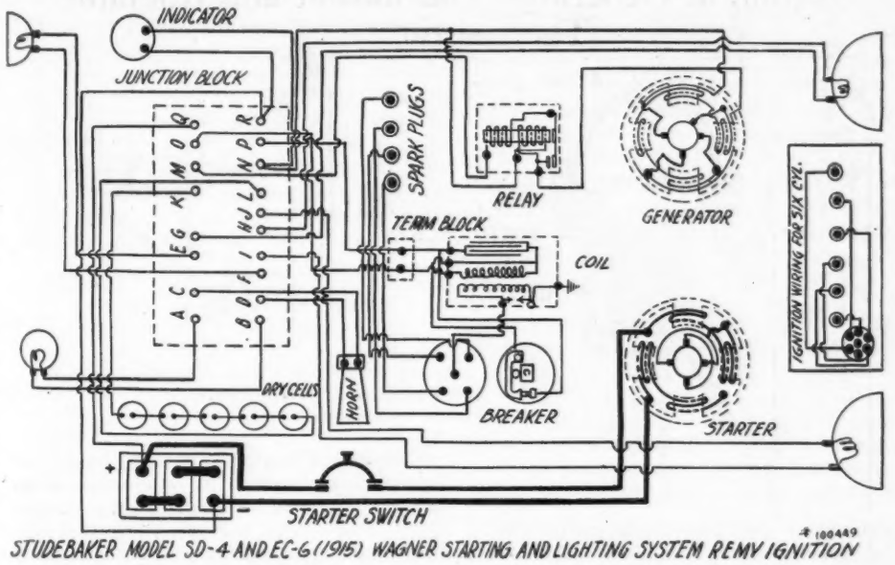
To do this job it would be necessary to secure an internal gear drive axle. It would also necessitate lengthening the driveshaft and various other details. Taking all in all it would cost probably as much as the purchase of a new truck.

### VALVE IN HEAD INCREASES POWER OF FORD

Q—Have a Ford which needs a little more power on low and high in order to buck this gumbo mud and also to make a few grades on high that I cannot quite make at present. Would the Rajo head be O. K.?

2—This Ford is a 1919 model, is equipped for starter but there is no starter on the car. Which would you prefer, the Liberty Generator with distributor head mounted on the generator or a high tension magneto?—G. M. Dillow, Great Falls, Mont.

1—The Rajo head would prove satisfactory for this work.




STUDEBAKER MODEL SD-4 AND EC-6 (1915) WAGNER STARTING AND LIGHTING SYSTEM REMY IGNITION

2—If you intend to install a battery on this car to use for lights the generator battery system of the Liberty type should be more economical as regards first cost of installation. If you do not intend to install a storage battery the cost of the magneto would be lower. The various advantages of battery and magneto ignition systems are too lengthy for discussion. The current practice among cars which are equipped with an electric starter shows a preponderance on the battery ignition system. Both systems will give satisfactory results, although one may offer certain conveniences that the other does not possess.

### REMOVAL OF END THRUST

Q—I have a Chevrolet eight cylinder model D5, 1919, car. The cylinder blocks were reground in this engine and new pistons installed and rings fitted. Would you advise putting in cast iron pistons? Would it decrease the power and speed to do this? If I re-install aluminum pistons, what clearance should they have?

2—The crankshafts in these engines develop about 1/16 in. end play. What would be the best method to take it out? I took the center main bearing out and sweat on about 1/16 of an inch of brass on the side of the bearing, and this took the end play out for a short time, but it is back again. Give remedy for this trouble.—E. G. Miller, Belmond, Ia.

1—The recommended equipment is the equipment used by the factory today which is aluminum pistons. If you install aluminum pistons we would advise that you secure the non-expanding or constant clearance type of piston. They should be fitted with approximately .001 in. clearance to each inch of cylinder bore. This clearance to be allowed at the skirt. The clearance at the ring land should be much greater, .003 to .005 of an inch for each inch of cylinder bore is allowed for clearance at the top ring land.

2—Apparently this crankshaft has a ridge worn on the face of the crankcheek which causes it to rapidly wear out the center bearing end. If this face is turned down to a smooth surface on the lathe and a new center bearing installed it should give satisfactory service. The brass plate on the end bearing will also give excellent surface. There is no reason for buying a new crankshaft if the present crankshaft is not injured.

### SPECIFICATIONS OF STANLEY STEAMER

Q—What is the maximum r.p.m of the Stanley engine?

2—What is the h.p.?

3—What is the gear ratio?

4—Was there ever an authorized race between the steam car and the gasoline car? In what year was it, and where? What speed was made?

5—What is the maximum speed of the Stanley stock car?—Henry Walkey, Jackson, Mich.

1—Approximately 1,475 to 1,500 revolutions. At 50 m.p.h. the engine turns over 901 revolutions per minute.

2—20 h.p.

3—There is no gear reduction on the Stanley steam car. The engine driving direct to the rear axle, consequently no transmission is used.

4—The Stanley Company has no record of such a race.

5—Approximately 80 m.p.h.

### SERVICE TRUCK BODY FOR FORD

Q—Publish drawing of a good service truck body to be used on one-ton model Ford, with derrick on ear. Said derrick to be so one can remove and carry it out of the way on side of truck.—Porter Jones, Kirkwood, Mo.

A drawing of a service truck mounted on the Hupmobile chassis was published in the January 5, 1922, issue of MOTOR AGE. By enlarging this body but adhering to the same type of derrick construction you can secure the results which you desire.

### WANTS TRANSMISSION FOR THOMAS-DETROIT CAR

Q—We have a 1914 model Thomas-Detroit and would like to get a transmission for it and understand the company is out of business. Can you give me any information as to where this may be purchased?—D. L. London, Hemphill, Texas.

Parts for this car may be secured from the Puritan Machine Co., Detroit, Mich., and New York City.

# Action of Generator Thermostat and Radiator Thermostat

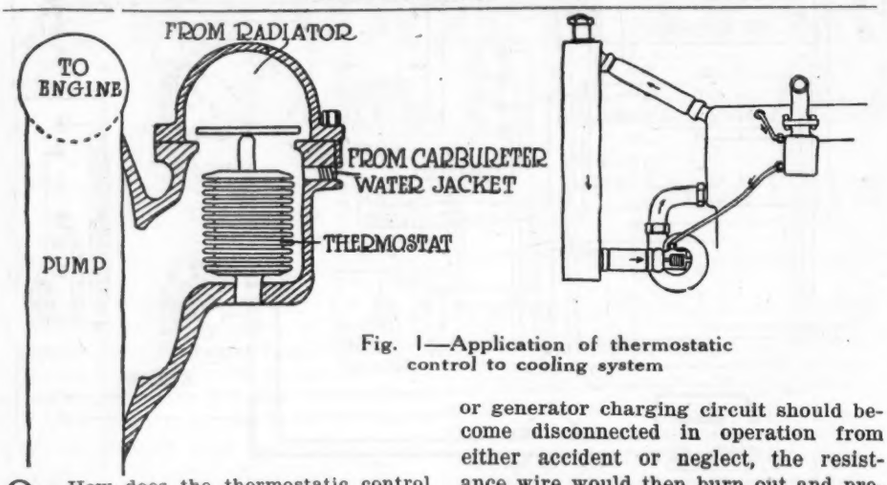



Fig. 1—Application of thermostatic control to cooling system

Q—How does the thermostatic control operate on Reo Six and other cars? Give reason for same.

2—How does the thermostatic control work in some of the latest cooling systems? Give reason for same and how constructed.

3—What make of vehicle does the General Motors Corp. manufacture? What has this concern to do with other standard makes of cars?

4—Give instructions for relining 490 Chevrolet clutch.

5—Would any intake manifold or hot-spot help to increase the power and speed of a 1922 Ford?—Wisconsin Subscriber.

1—Although this question is indefinite we assume that it refers to a thermostatic control of generator output. The thermostatic control is constructed on the theory that a generator as well as a storage battery produces heat in a definite relation to the amount of current flowing. The thermostat is generally used in connection with the third brush regulation type of generator. The thermostat resistance acts as a protective fuse to the generator in case the battery or generator charging circuit should become disconnected in operation from either accident or neglect, the resistance wire would then burn out and prevent the generator windings from being damaged. Mechanically the thermostat is constructed as shown in Fig. 2.

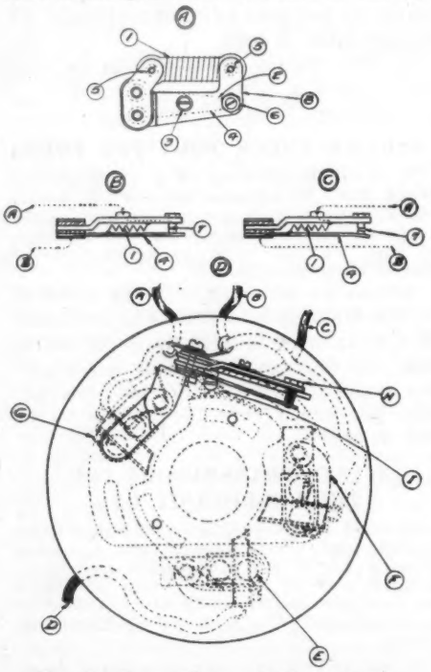


Fig. 2—Remy thermostatic generator control

Fig. 2 shows "A," a stamped steel bracket 8 carrying a resistance unit 1 connected to 8 at 5, a thermo-blade 4 with stationary contact point attached and an adjustable screw silver contact 6 with solder sealer tube to keep the proper adjustment. Current flowing from "A" will take the path of least resistance through the contact points 7 to "B," as the resistance unit 1 is so much greater than that of the steel bracket and the thermo blade the current will flow as indicated by the dotted lines. In illustration "C" you will note that contact points 7 are standing apart due to the internal heat of the generator having attained approximately 175 deg. Fahr. causing the thermo-blade 4 to warp, then the current will flow as indicated on the dotted line from "A" to "D" through the resistance unit 1, with a consequent lower output from the generator.

2—The thermostats used in the modern automobile cooling system operate on the principle of expansion and contraction of certain liquids. The principle of the Cadillac thermostat is shown in Fig. 1. There is interposed in the water pump line for each set of cylinders a thermostat, which simply is a small coil copper tube containing a liquid which expands or contracts in accordance with the temperature, thus slightly lengthening or contracting, its total movement being ¼ in. This thermostat is in connection with a valve, so that when it expands, it raises the valve from its seat, this valve controlling the flow of the water to the radiator from the pump.

A by-pass connects with the water jacket of the carbureter, and when the engine is started the water naturally is cold. Therefore the thermostat is contracted and its valve is on its seat. Thus the radiator water is shut off, the circulation being simply through the water jackets of the cylinders through the by-pass to the carbureter jacket and thence back to the cylinders. In this way there is only a small part of the water circulating, and when this heats up, the thermostat begins to expand and lift its valve from its seat, letting the radiator supply flow into the system. This action continues back and forth, so that the water temperature is nearly constant.

3—The General Motors Corp. controls the output of 42 different companies, prominent among the makes of cars which they control are the Cadillac, Buick, Chevrolet, Oakland, and G.M.C. truck, also the Scripps-Booth car. They also control the Western Axle Company, and several large parts manufacturing concerns. These latter companies are in production on parts used in the assembly of cars, which the General Motors Corp. does not control.

4—To remove the clutch proceed as follows: Remove the rear axle, transmission and clutch shifter yoke, the clutch hub and spring are now accessible. The clutch spring may be removed in the following manner: Drill two ⅜ in. holes 3 in. between centers in a piece of flat steel 5/16 in. thick, 1 in. wide and 4 in. long, secure two cap screws and nuts ⅜-16 threads by 3 in. long. Obtain an ordinary pipe coupling whose inside diameter is ⅝ in. or large enough to allow the clutch spring tension rod to pass through it Saw or file a slot clear across this coupling and about ¾ in. deep, hold the coupling between the steel bar so that the clutch spring tension rod will pass through the holes and the clutch spring pin will be in the slots. Alternately tighten the nuts on the bolts until the spring is compressed sufficiently to permit the pin to be driven out with a round punch through the holes in the clutch hub. The application of this spring compressor and slotted

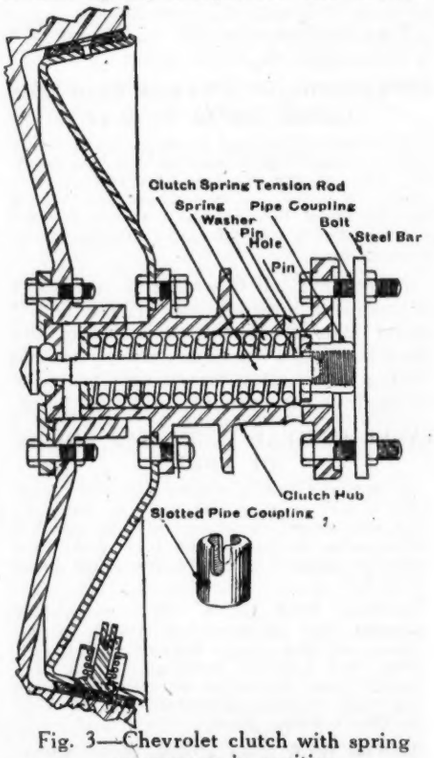



Fig. 3—Chevrolet clutch with spring compressor in position

pipe coupling is shown in Fig. 3. The clutch hub and clutch cone can then be removed.

If it is necessary to replace the clutch spring, remove the tension of the spring by alternately unscrewing the nuts holding the steel bar and pipe coupling in place.

The operations are reversed if the spring is to be installed. Be sure to place the clutch spring retaining washer between the spring and slotted pipe couplings and have the slots on the coupling in an upright or vertical position before applying pressure to the spring.

The spring seat in the hub will guide the spring tension rod through the center of the spring and through the retaining washer. The spring must be compresed sufficiently so that the hole in the spring tension rod lines up with those in the hub. In relining the clutch soak the leather in water for a short time so that it will stretch slightly. Place the leather so that the smaller diameter lies upon a perfectly flat surface. Then guide the cone into the leather evenly all around and press it down as far as posible with the hand, then tap the cone lightly with a hammer around its circumference until it is completely inside the leather. Punch or drill holes in the leather corresponding to those in the face of the cone and insert rivets. On the model 490 there are six clutch leather expanders.

These expanders are placed under the clutch leather and present a slightly raised point of contact. Their function is to prevent the clutch from grabbing. If the clutch grabs the expander should be adjusted. To adjust the expanders, turn each of the expanding nuts in the same direction as the hands of a clock or right to left until they lightly touch the clip, then give them a half turn in the opposite direction.

5—A hot-spot of the replacement type will probably assist in vaporizing the present poor grade of fuel. A name of a successful hot-spot for this car will be supplied by special letter.

### OVERHEATING CAUSES FORD PISTONS TO STICK

Q—We have a 1916 Ford which was reground and De Luxe pistons and Burd rings installed. This was about nine months ago and now the pistons are sticking as though the engine was not getting lubrication. We blew out the oil line, but this did not help any. Took the engine down and found the oil lines all open. Pistons and rings in first class condition.

Reassembled the engine and put five quarts of oil in the case, but it still overheats and sticks, at a high speed of 30 miles per hour. Runs perfect at all speeds. Has good pickup and throttles down nicely. Water circulation is free. Spark advances all the way. Exhaust manifold seems to get red hot in about ten minutes after engine is started, but does not seem to boil the water. Where may I find my trouble?—J. H. Sampler, Sansom, Texas.

This trouble is due either to insufficient piston clearance or improper timing of the valves. De Luxe pistons in the Ford engine must be fitted with slightly greater clearance than the regular Ford piston. A minimum of .004 in. clearance should be allowed at the skirt. If the clearance is less than this the pistons will stick at the high speeds if allowed to run for any length of time on nearly wide open throttle. The valve timing should be checked over carefully and the tappet clearance should be not less than .018 in. The exhaust valve should close at exactly top dead center.

### IMPROPER SIZE IDLING WELL PREVENTS CHEVROLET FROM IDLING CORRECTLY

Q—Can the 1917 Saxon Six flywheel be removed without dropping the crankshaft?

2—The 1915-490 Chevrolet engine has been overhauled and is in good condition. Running idle it will only hit on No. 3 and 4, but No. 1 and 2 delivers a good spark. Removed No. 3 and 4 and replaced them in No. 1 and 2 and still No. 1 and 2 cylinders would not give any power idling, but driving on the road I cannot notice any miss in the engine. Have examined the manifold for a leak. The compression is good in all cylinders.

3—What year was Haynes car No. 1743 produced? What is the h.p. of this engine?—Amherst Garage, Newark, O.

1—Yes. It will be necessary on some models to cut off one of the flywheel bolts which is sometimes riveted.

2—This probably is due to a derangement of the idling well or improper idling adjustment of the Zenith carbureter. We would recommend that you bring this Zenith carbureter to a Zenith service station where they will be able to apply the necessary service to put this carbureter in good condition. If this car cannot be driven to a service station the carbueter should be removed and sent to the Zenith Service Station in Chicago.

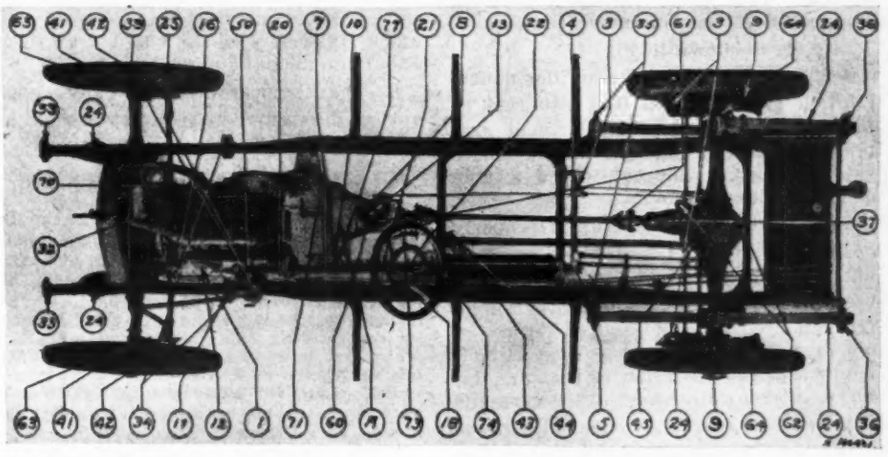
3—We are unable to supply any data on this car unless we have the serial number. The serial number is stamped on the number plate on the timing gear case, or dash, at the extreme right side.

### LUBRICATION OF COLE CHASSIS

Q—Publish complete lubrication chart for a 1914 Cole four.—T. J. Rice, Whittier, Cal.

A chassis lubrication chart is shown below.

## Chassis Lubrication Chart for 1914 Cole 4



**Cylinder Oil Every 100 Miles**

1—Oil reservoir of motor

**Cylinder Oil Every 500 Miles**

3—Brake rod connections
4—Brake cross shaft and tube
5—Brake cross shaft bearings
7—Brake pedal bearing and connections
8—Brake lever quadrant and parts
9—Brake connections (internal) — remove rear wheels
10—Clutch pedal bearings and connections
11—Carbureter auxiliary air valve stem
12—Crankcase vent tube—one point
13—Change speed lever H slot and parts
16—Distributer on magneto (ignition)—wipe with oil
18—Muffler cutout valve stem
20—Steering gear jacket (lower bearing)
21—Steering gear jacket (upper bearing)
22—Steering gear quadrant and levers
25—Spark and throttle connections
73—Speedometer pinion
74—Muffler cutout bracket
77—Brake rod end on foot pedal

**Grease Every 500 Miles**

24—Spring leaves (jack up frame)
31—Clutch spider hub—not shown in cut (remove cover A)
32—Fan bearing
33—Front spring front eye bolts
34—Front spring rear eye bolts
35—Rear spring front eye bolts
36—Rear spring rear eye bolts
37—Pinion shaft bearing (rear axle)
38—Rear axle spring seats (not shown)
39—Reach rod
41—Steering knuckle king bolt
42—Tie rod yoke and bolts
43—Torque arm spring housing bolt
44—Torque arm spring housing
45—Torque arm axle rivet bolt
71—Starting transmission case

**Grease Every 1500 Miles**

50—Steering gear housing
60—Transmission case
61—Universal joint front and rear
62—Rear axle differential housing
63—Front wheel bearing
64—Rear wheel bearing
70—Timing gearcase.

## CONVERTING SINGLE MAGNETO INTO DUAL

Q—I have a Cleveland Six 1921 with Bosch high tension magneto. Could this be made into a dual system? If so what extra parts would I have to put on?

2—Would an extra coil be necessary and could the breaker and distributer or magnets be used?

3—Show diagram how to wire this for dual system.

4—Could this be made into a double ignition by using same spark plugs, or would there have to be two sets of plugs?

5—Is magneto easy to burn out by leaving spark plugs disconnected and running engine?

6—What advantage has the dual over the single system ignition?—M. K. Jackson, Virginia, Minn.

1—This magneto could be converted into a dual system but it would necessitate a change in the breaker mechanism, the distributor block and would mean the addition of another terminal or binding post on the magneto.

2—To convert this single magneto into a dual system would require the addition of a coil. If the Duplex system is desired it eliminates purchasing a new distributer block. The Duplex system makes use of a non-vibrating coil and the magneto secondary winding is used to secure the secondary current on the battery system. This would require a different housing cover and breaker plate.

3—This is shown in Fig. 4.

4—The usual definition of the double ignition system states that two sets of plugs are used. Two independent systems of spark production with a single set of plugs is not considered a true double ignition system.

5—If the safety spark gap is properly adjusted it should be very difficult to burn out the windings.

6—The advantages of dual over single ignition are: that in case of failure of one system the other can be used without hampering the operation of the car. Ignition system failures are very rare and it is doubtful whether additional expense of the dual system for ordinary usage is justified.

## REBUILDING MAXWELL FOR DIRT TRACK

Q—Is the Maxwell considered a high or low speed engine?

2—How much could the wheelbase be cut down?

3—Where can I secure high speed gears for this model, 1916?

4—What gear ratio do you recommend for a half mile track?

5—How many m.p.h. will this car travel with 3 to 1 gear in it?

6—Publish illustration of this car as a racer.—Robert FitzSimmons, Dalton, Neb.

1—The Maxwell is considered a semi-high speed engine.

2—The wheelbase can be cut down to 96 inches, shortening the drive-shaft housing. It will require considerable work.

3—High speed gears can be obtained from any of the leading gear manufacturers.

4—The present gear ratio should be very good for half mile dirt track work. This is 3.58 to 1. If the engine speed is increased considerably by the lightening of parts we would recommend that a gear ratio of approximately 4 to 1 be installed. A reduction in the gear ratio could be secured by installing smaller rear wheels on the car. For satisfactory service on half mile dirt track it is necessary to have a very high gear ratio that is, a great reduction in order to secure the necessary get-a-way and to have the proper power for the short turns and straight-away.

5—On a perfectly smooth road giving the car plenty of time to accelerate this stock Maxwell with its 3 to 1 gear ratio should do about 65 m.p.h.

6—The illustration of this car as converted into a racer is being mailed to you.

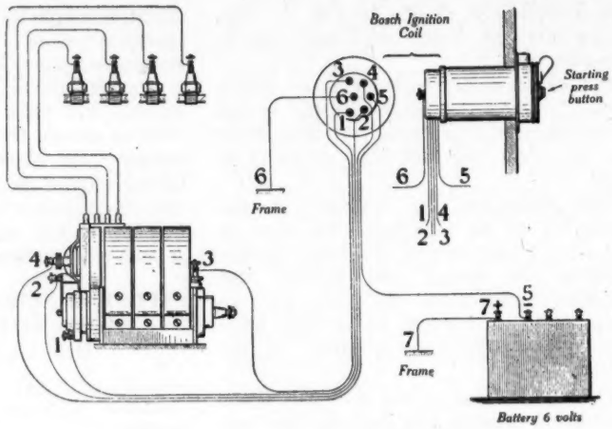



Fig. 4—Wiring of Bosch dual magneto to four cylinder engine

## STARTER MUST BE REWOUND FOR LOWER VOLTAGE

Q—Have a 1912 Interstate model 41, and wish to make a roadster of it. We also want to change wiring system, it formerly required a 30-volt battery. Is it possible to use a 6 or 12-volt battery by rearranging the wiring system? Explain just how this can be done. It also has an Apelco generator and starter combined. Can we still use the generator on a 6 or 12-volt battery, or would it be necessary to have it rewound?

2—Have you any suggestions as to the best way to lower my steering wheel? —Frank Porter, Pittsburgh, Pa.

1—A rearrangement of the wiring is not all that would be necessary in order to use a 6 or 12-volt battery. If you wish to use a 6 or 12-volt battery it will be necessary to have the starter rewound. We would suggest that you communicate with the Splitdorf Electric Co., Newark, N. J., who will be able to give you an estimate on the cost of this revision.

2—To change the angle of the steering column it will be necessary to remove the bolts that hold the worm housing to the frame, then move the entire steering column to the desired angle by a system of blocking at the dash and drilling of holes in the frame the column can be anchored wherever desired. However, the steering column cannot be shifted fore and aft unless a different length drag link is used. The beveled wedges should be cut from maple or some wood that is fairly hard and has no tendency to split.

## HOW TO STOP OIL LEAK ON JEFFERY

Q—We have a car that is giving considerable trouble with oil leakage. This is a 1915 Jeffery four. The oil from the engine works into the starter and generator located in the flywheel and it will not generate. What could be done to remedy this trouble?

2—Is there a washer used between the rear motor bearing the generator?—W. J. Maurer, Freeport, Ill.

1—This trouble can be overcome by removing the crankcase and pinning same at the point where the case fits up to the rear main bearing to a point that crankshaft will make a bearing in crankcase. This means that the case is to be peened so that it fits up to the crankshaft at the rear bearing just as the bearing itself does, so that the case will be a continuation of the rear main bearing. This operation is usually done by holding a heavy piece of iron in the inside of the case and striking the end of case from the outside, squeezing the metal so that it will touch the crankshaft.

If the case is peened too much and becomes too tight, Prussian Blue should be used and with a scraper remove surplus metal until it will give the proper clearance without binding the crankshaft. In extreme cases a scupper can be riveted on the outside of the case in line with point where oil would drip from rear main bearing. A hole should be drilled through case so that oil entering upper pocket will return to interior of crankcase. The above practice is recommended by the local service station of this company.

2—No.

## READER WANTS HOT-SPOT FOR ENGINE

Q—Supply name of hot-spot of the replacement type mentioned in your January 12, issue of MOTOR AGE.—Auto Service Co. Kimberly, Idaho.

This information will be supplied by letter.

## NATIONAL COMPANY MAKES OWN ENGINE

Q—Give make of engine used in a National 1917 model Cloverleaf Chummy Highway 6. The bore and stroke of this engine is 3½ by 5¼.—John Goodfellow, Jr., Lyons, Kans.

The engine used in the 1917 National was of their own manufacture.

## CHALMERS WON'T START BECAUSE OF WEAK SPARK

Q—We have a 1915 Chalmers six cylinder equipped with an A. K. 2 ignition system, which is giving trouble when starting. Sometimes it will start right out in the coldest weather, but as a rule I cannot get a spark at the plugs or if there be one, it is usually very weak. I installed a new coil but the same thing occurs. I have also put on a new notched shaft, lifter and contact points. After the car is started in the morning it seems to be good for all day, and also runs good otherwise.

2—Give information on how to adjust carbureter on White 30 and also the name of the maker of this carbureter.

3—I cannot set the Rayfield carbureter on the Chalmers rich enough for high speed; advise trouble.—West End Garage, R. C. Huge, Oskaloosa, Ia.

1—This car is equipped with an 18 volt battery while the ignition is 6 volts. This trouble is due to weak cells on the ignition circuit. We would recommend that you carefully test the three cells to which the ignition circuit is connected, and bring them up to proper charge. This should eliminate the trouble. On an 18-volt battery of this type it is very difficult to get even charging of all the cells. This condition accounts for the erratic trouble you encounter when starting this car.

2—The one adjustment on the White 30 carbureter is located at the lower left hand side of carbureter and consists of a knurled nut, which regulates the air supply for idling adjustment. The adjustments for intermediate and high speeds are secured automatically. Any failure of the carbureter to operate is due to the jets being clogged or wrong float level. Would recommend that you remove this carbureter and thoroughly clean it, then reassemble and adjust. This carbureter is manufactured by the White Motor Car Company, Cleveland, O.

3—This is due to the wrong size high speed nozzle. If the carbureter is equipped with the original equipment of jets and metering pins it should handle the high speed range successfully.

Examine carefully the dash pot spring which controls the amount of air admitted at high speed, if this spring has weakened the dash pot valve will leave its seat too easily and will admit an excess amount of air.

## HEAT TREATMENT FOR EXPANDING WORN PISTONS

Perhaps MOTOR AGE readers will be interested in the heat treatment I have been using for expanding worn pistons. The procedure, which has given very good results in several cases, is as follows: Build up a brick furnace, making it as tight as possible. Heat the enclosed area to a low red heat before placing the pistons inside. Hold the pistons at a cherry red heat, as even as possible, for one-half hour. Allow to cool as slowly as possible, protected from drafts.—L. P., Bicknell, Calif.

The contributor failed to mention what kind of fuel he used, but this point seems to be of slight importance, as there are records of cast iron steam valves which have grown in size from being subjected to heat as low as 560 deg. A former article to which the contributor refers recommended that the pistons be buried in charcoal and left until completely cold.

(We thank L. P. for this contribution, and if he will favor us with his full name and address we will be pleased to express our appreciation by personal letter.—Ed.)

## AMMETER REVERSES ON OVERLAND CAR

Q—Give firing order of model 75 Overland.

2—Explain following: I placed the battery in this car as it was when removed for charging—the ammeter shows recharge clear to stop pin. What would cause this with starter switch open? No shorts visible in wiring. What would be the effect of connecting positive pole where negative pole on battery should be? Found short circuit on this car. Starter switch is jammed and it shows charge on ammeter when it should show discharge. Wiring has never been touched in my shop. I am asking these questions theoretically. — Menan General Repair Shop, Menan, Idaho.

1—The firing order of this engine is 1-3-4-2.

2—We should state offhand that the ammeter has been reversed. To install the battery in the car properly, would advise that you determine the polarity of the generator wires leading to the battery and with this information place the battery in accordance. It is possible also that the generator has been reversed although this is improbable. With the engine running, disconnect the battery and with a voltmeter of known polarity determine the positive and negative wires.

If no meter is available any of the numerous methods of determining polarity should be used. If a battery which is fully charged is installed in the car and its current flows to the generator either through closing the cut-out points or through a derangement in the wiring it is possible to reverse the generator polarity. With the generator operating it is almost impossible for the battery to reverse the generator.

## WIRING DIXIE MAGNETO FOR BATTERY

Q—Would it be possible to attach a battery to a Dixie High Tension four cylinder magneto for the purpose of making the engine start easier?—Clyde Wilson, Goldfield, Ia.

Reference to Figs. 5 and 6 will make clear the following explanation of how to wire a battery into the magneto circuit. After removing the sheet metal cover of the magneto it will be noticed that there is a small strip of brass connecting the coil to the metal of the apparatus. This is shown in Fig. 5, the connections being indicated by numbers 16 and 22. In Fig. 6 this part of the circuit is indicated at the point marked X.

Procedure: Remove the brass strip and connect one wire from a battery to the small screw at point 22. It will be noted that the switch used with the magneto has the effect of short-circuiting it. For this reason it will be necessary to disconnect the switch as with the battery, one side of which is grounded, connected, the switch in the off position would have the effect of a dead short circuit.

A simple three-point switch such as that shown in Fig. 6 should be substituted. It will be seen that with the lever to the left the battery current passes through the primary winding of the magneto and through the breaker points to the ground and thus returns to the battery. With the switch lever in the right hand position the magneto functions as it was normally designed to do, while the center position of the switch opens all circuits and shuts off the ignition. While it is true that the battery current opposes the action of the magneto in one way it assists it in another so that magnetos so changed over have been known to give satisfactory service for thousands of miles.

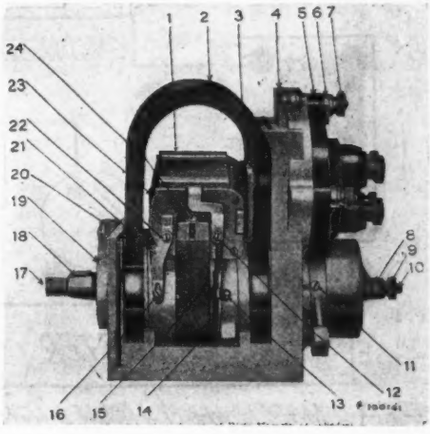



Fig. 5 — Splitdorf - Dixie magneto, showing point of attachment for battery for easy starting

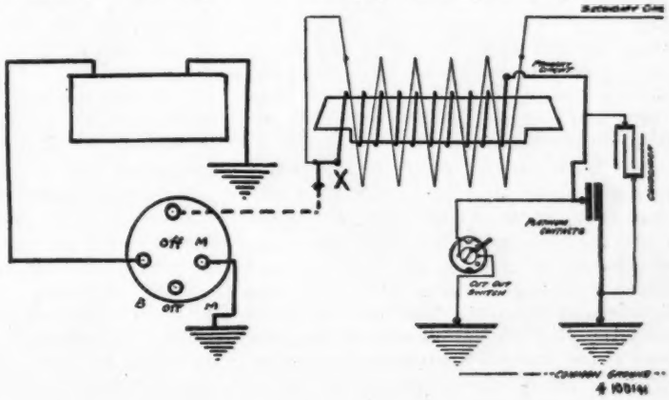



Fig. 6 — Wiring diagram of single high tension Dixie magneto with battery connected for starting

### PUZZLING PROBLEM OF HORN REFUSING TO ACT

Q—We have a 1918 Reo 6, the horn would blow when motor was idle, but when the ignition switch was on and the horn button was pressed, the ammeter showed high discharge and the horn refused to act. Suspecting an internal ground in the horn and a possible ground from the ignition circuit to the metal dash, on which horn is mounted, we reversed horn connections, and everything functioned properly. What is the trouble?

2—On a 1914 Ford motor (rebuilt like new), the rod bearings loosen up slightly after 50 to 100 miles of running. One crank pin is .0015 in. out of round, but this one does not loosen more than the rest. The rods get loose enough to be audible, but get no looser, even though the car is run 1000 miles without adjustment. The bearings are good; oil pipe is in good condition. Spencer-Smith semi-steel pistons are used. The car is often run 10 to 50 miles at a speed of 30 to 40 miles per hour. Would dippers on the bearing caps help?—Florello H. Clark, Syracuse, N. Y.

1—In regard to the peculiar trouble noticed in connection with the operation of the horn and the ignition there is not much question but what you have hit on the real nature of the trouble.

It is also evident that the wiring is a two-wire system as in a single wire system or grounded system a single ground either in the horn or ignition is enough to cause trouble, but in a two wire system one ground does not cause any trouble.

In checking up this problem we got in touch with the Reo Service Station in Chicago, who advised us that the car in question was their model M or N and that a two-wire system was used. We then checked up the diagram and found it very complicated so we have made the sketch shown in Fig. 7 in which only those portions of the diagram that affect our problem are included.

We have also shown two accidental grounds which are located in such a way that they would account for the symptoms you describe. You will note that the ground at the left on the wire running from the ignition switch to the ignition coil would be disconnected from both the plus and minus side of the battery if the ignition switch was turned to the off position and the interrupter points did not happen to be closed; then with only one ground in the system this being the one in the horn the operation of the horn would be normal.

Now assuming that as you describe the ignition switch would be turned on the accidental ground in the ignition circuit would then ground the positive side of the battery. Then when the horn button was pressed the negative side of the battery would also be grounded through the ammeter and the horn button and the accidental ground in the horn winding.

By reversing the wires on the horn, however, the accidental ground in the horn would be connected to the positive side of the battery and as the closing of the ignition switch also connects that ground to the positive side of the battery this terminal only would be grounded and no short circuit would result. If you wish to check up the car in order to detect and remove any ground we would suggest that you disconnect both cables at the battery and then use another battery or a few dry cells in series with a voltmeter with one free lead coming from the voltmeter and another from the end of the dry cells or battery that is not connected to the voltmeter. These two leads will then act as test wires which when touched together will give a voltmeter reading.

If one of these leads is now connected to the frame of the car and the other to various parts of the wiring a reading on the voltmeter will indicate a ground in the wiring. To locate the exact position of such a ground, however, it may be necessary to disconnect the various parts of the circuit to determine the exact location.

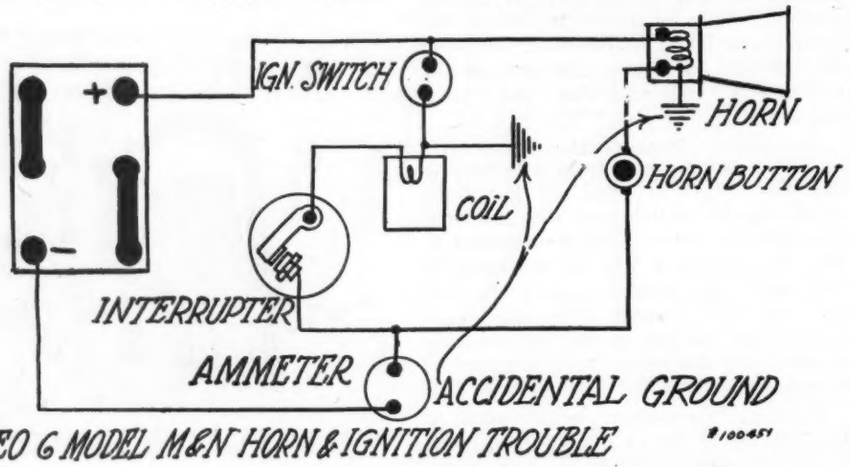



Fig. 7—Graphical solution of queer action of warning signal

2—In regard to the rebuilt 1914 Ford motor in which the rod bearings continue to loosen slightly, would suggest that you check up on the following points:

First—We think it possible that the connecting rods may not be perfectly aligned with the pistons, so that when the bearings are tightened down there is a slight cramping action which causes the bearings to wear at first until greater freedom is obtained, after which time the wear becomes inappreciable.

Second—It is possible that standard connecting rods are not being used and that inferior babbitt is being used.

Third—It is possible that the bearings are not carefully fitted and that they make contact with the crankshaft at a few high spots only which rapidly wear down causing the looseness that you have described.

Fourth—It is possible that when the connecting rod caps are drawn up that a good coating of oil has not been used on the surface of the babbitt and that a certain amount of wear takes place before oil from the crankcase works into the bearing surfaces.

Fifth—We would call your attention to trouble recently being experienced in all types of cars, due to gasoline working down past the pistons and causing dilution of the oil, thereby reducing its lubricating properties. We believe that if you check up on the above points that you will get satisfactory operation from your car.

### STARTING TROUBLE WITH 1912 THOMAS

Q—We have a customer who has a 1912 Thomas car, model 6-90, which has been well taken care of and is in good condition mechanically, having recently been rebuilt at considerable expense. This car is equipped with Bosch magneto and Leece Neville starter, the starter having been put on after the car was built.

Trouble is experinced starting on cold mornings unless hot water is applied to the intake manifold, the motor also loads up on hills, and to a certain extent until a speed of 25 M.P.H. is obtained. Various makes of carbureters have been tried without eliminating the trouble, the car at present being equipped with a Schebler, which comes nearer giving satisfaction than any other make.

I am satisfied the trouble is due to low gravity gasoline, which does not vaporize properly. The manifold is brass and exceptionally long, compared to present day manifolds. I will greatly appreciate your opinion regarding the above and also the name of a reliable hot-spot maker.—P. B. Jones, 5820 Valesco St.

A—The name of a firm making hot spot manifolds will be sent you by letter. An electric vaporizer would facilitate starting.

### SPEEDSTER BODY FOR FORD

Q—Describe and illustrate method of attaching a body to a Ford chassis which would have the appearance or lines of a Marmon motor car or the product of the Bub Body Corporation. Publish full details.—James F. O'Neill, South Boston, Mass.

We are not in a position to supply details for construction or attachment of such a body, but will refer you by special letter to a certain firm who make a specialty of supplying patterns and working diagrams for the construction of the above mentioned body.

### CUSHMAN ENGINE

Q—Publish illustration of National Speedway roadster and also Oldfield's "Old Glory." Give address of Cushman stationary engine.—C. Grimes, Newark, Ark.

We regret to state that we have neither one of the pictures mentioned. —The Cushman Engine Co., Lincoln, Neb.

# SERVICE EQUIPMENT
## Aids for Time Saving & Accuracy

### ONAN COMBINATION UNIT

In this unit is combined the Onan testing device, a complete and universal test rack for driving every make of generator, starter and magneto, and the Onan lather and mica under cutter which is designed for electrical repair work. This equipment will handle all repair work, including drilling, fitting and making of small parts and driving and testing generators, starters, etc., after they have been removed from the engine. With this unit it is possible to do turning, boring, drilling, winding, undercutting and testing. These equipments mounted on a stand with drive pulley attachments, belts, etc. Price $120, without motor. This same equipment furnished with 3-jaw 3-in. universal chuck with live head stock with clutch combined, inside boring tool. Price $140, without motor. Shipping weight complete, 175 lbs.—David W. Onan, 43 Royalston Ave., Minneapolis.

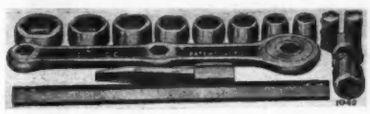
### SERVICE WRENCHES

The Service Wrench, pictured here, consists of all of the various parts and connections in the illustration, designed to fit every part of the car, especially those which are hard to reach. Price complete, $6.80. Wrenches and fittings for parts of various cars are also supplied or can be bought separately. The regular Service outfit as pictured here does not, however, include Ford wrenches which, because of their handiness in reaching difficult parts, are, according to the manufacturers, in demand. —Service Engineering Co., Boston, Mass.

### HB HEAVY DUTY COMPRESSOR

This outfit is compact and furnishes 6 cu. ft. of air per minute. It is especially designed for the oil station or garage where space is limited. If desired, it will maintain a pressure of up to 300 pounds automatically on the air lines. Hobart Brothers Co., Troy, N. Y.

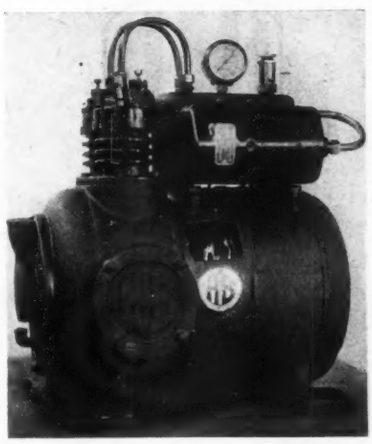
Stevens ring gage



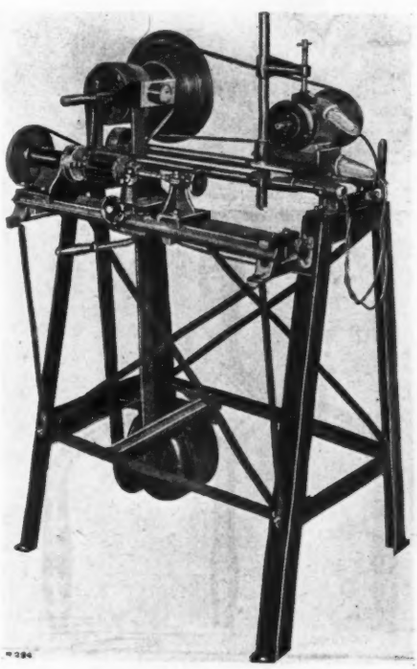
Service wrenches

Pedrick piston ring pliers

Phenix garage door bolt



HB heavy duty compressor



Onan combination unit

### ELMCO IGNITION TESTER

The Elmco Ignition Tester enables the service station man to make tests on all makes of magnetos, magneto armatures, coils, condensers and spark plugs. This test unit is supplied either as a separate unit or to be operated intregal with the Elmco Universal Test Stand. The Elmco Ignition Tester is equipped with a high tension spark coil, a mechanical interrupter for breaking the primary circuit on coil and armature tests, spark gap, magneto armature holder, operating switches and all necessary leads.—Electric Machine Co., Indianapolis, Ind.

### STEVENS RING GAUGE

Stevens Ring Gauge makes it unnecessary to bring the cylinder block up to the bench to have new rings fitted properly.

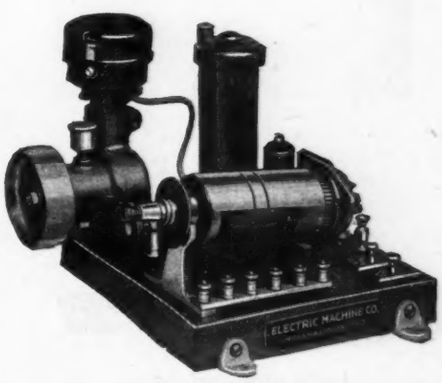
First, one ring is fitted to the engine wherever it is located. This ring is then placed in gauge where the opening in the ring is measured with a thickness gauge. This measurement is duplicated in all the rings, right at the bench.—Steven & Co., 375 Broadway, New York.

### PEDRICK PISTON RING PLIERS

This tool grips and spreads the ring in one operation and makes it possible to place and remove piston rings quickly. The rings are caught in the jaws of the pliers, and by pressing the handles together are spread in a natural way sufficiently to slip over the piston and to be placed in their proper groove Wilkening Mfg. Co., Philadelphia, Pa.

### PHENIX GARAGE DOOR BOLT

The cut illustrating this bolt, which is intended for use especially on the garage door, shows clearly the functioning. It is convenient inasmuch as it can quickly be operated. Phenix Mfg. Co., Milwaukee, Wis.



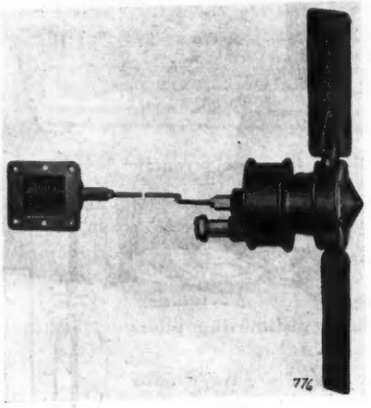

Elmco ignition tester

# The ACCESSORY SHOW CASE

## New Sources of Retail Profit

### THERMATIC FAN

The Thermatic Fan, it is claimed, attains that point of perfection in the cooling system which not only tends to do the work of the fan in keeping the engine from going above 175 deg. Fahrenheit, which is the most favorable temperature for operating a motor, but also keeps the temperature from dropping below that mark by means of an automatic reverse, as pictured, which, when a low degree is reached, takes warm air from under the hood and sends it forward through the radiator. While primarily designed for automatic operation by means of the thermostat, manual control for setting the fan blades at the correct angle may, if desired, be provided in place of the thermostat.—General Necessities Co., 3033 Center St., Milwaukee, Wis.



Thermatic fan

### CHIEF MIRRORS

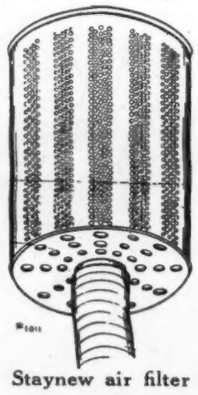
The Chief Mirrors are made in a variety of designs and styles to fit the many types of cars. They are placed over the driver's head on the windshield to reflect for him the objects behind the car. Prices, $3.50, up. Britton Auto Products Co., 67 W. 67th, New York City.

### GOSS FORD TRUCK GOVERNOR

Goss Ford Truck Governor is installed exactly the same as, and in place of, the generator. Goss Oechsle Co., Spokane, Wash.

### THE LITTLE ARISTOCRAT PUMP

The Little Aristocrat is a tire pump mounting on the running board when needed. It is electrically propelled and the power is drawn off the battery. It is said that this does not harm the battery. Price, complete, including sockets and wiring, $21.50. J. M. Royal Engineering Co., Milwaukee, Wis.

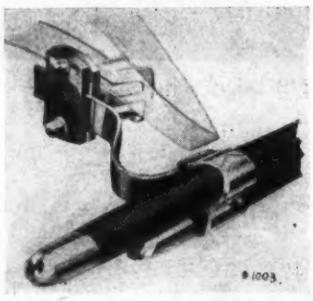


Staynew air filter

### STAYNEW AIR FILTER

The Staynew Air Filter is designed to give longer life to the engine.

It is connected with the intake on a carbureter or with the intake openings of the air compressors. The whole filter is so made as to easily permit of dust particles escaping. At the bottom is a rust proof metal tube which serves as an outlet for the filtered air. The inside is of perforated metal, increasing in size of perforation to three distinct sections, through which the air passes into the tube. Staynew Filter Co., Wrigley Bldg., Chicago.



Cushion car defender

### THE OVAL STOP SIGNAL

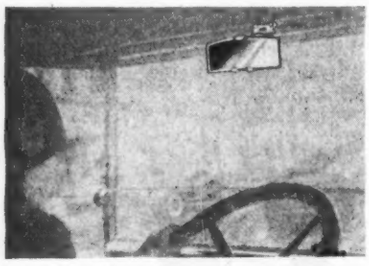
The Oval stop signal, a new and somewhat improved rear light inasmuch as it is so made that dust and water cannot get into it, is made of heavy gage brass, heavily nickel plated. The word "Stop" is embossed on the ruby glass and has a black background making the word visible in daylight and dark. Price, $7.50. Silva Mfg. Co., Cincinnati.

### CUSHION CAR DEFENDER

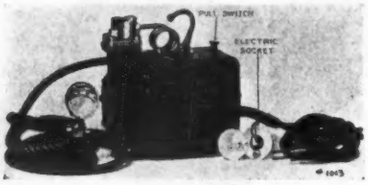
Made for both front and rear of cars, these bumpers have a core of steel with an outside coating of rubber, bringing about the shock check when the machine using them is struck or when another machine or object strikes it. Defender Mfg. Co., 1002 S. Michigan Ave., Chicago.

### THE EASYWAY WRENCH

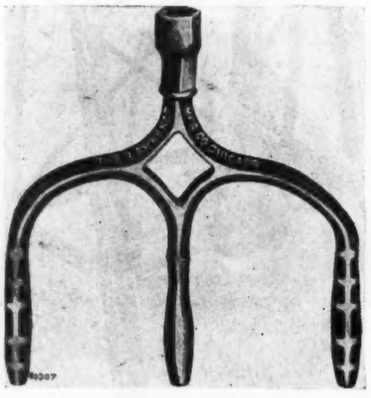
The Easyway wrench is designed for quick tire changes. The cut illustrates how this device saves time when first the nut is loosened and then it is spun off. Price, $1, F. K. Lawrence Mfg. Co., Chicago.



Chief mirrors



Little aristocrat pump



Easyway wrench

Oval stop signal

### EXHAUST LOCK FOR FORDS

The Lowry Exhaust Lock has been tested by the Underwriters' Laboratories and given a class "A" rating. It fits in the exhaust pipe of the Ford under the floor boards near the brake pedal and positively prevents anyone starting the engine until it is unlocked by the owner's key. The device consists of a small steel barrel containing a lock unit and butterfly valve assembled on a central shaft.

The complete locking device, including manifold protector, sells for $10. Manufactured and sold by the Exhaust Lock Co., 201-202 Chamber of Commerce, Indianapolis.

### DOUBLE BRAKE ATTACHMENT FOR FORDS

This attachment is for the emergency and the foot brake and when the emergency brake, which is the lever at the left of the car, is applied, the foot brake is also automatically put into action, stopping the car almost instantly and keeping it in neutral without the driver holding the foot brake depressed. Price, $2.50, complete. C. F. Loomis Mfg. Co., Peoria, Ill.

### WHITE TRACTION LOCK

Not only does the White traction lock serve as a protection against theft but it also is used to hold cars on the upgrade. It is permanently welded to the transmission case and projects above the floor about two inches. Special patterns are supplied for each make of car. White Traction Lock Co., Philadelphia.

### PLIERENCH

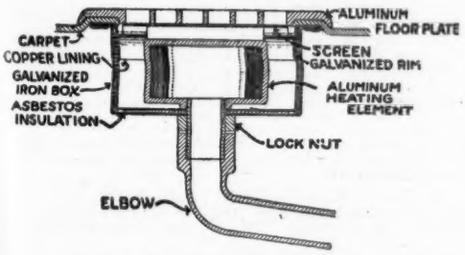
The Plierench, pictured here, is the product of the Flash Sales Corp., Chicago, and is featured by the many uses to which it can be put. It is designed to be of convenience in reaching nuts and bolts which are in inaccessible positions.

### VICTOR COPPER ALUMINUM HEATER

An exhaust heater for open and closed cars is offered by Victor Mfg. Co. which embodies a number of new features and is claimed to be light in weight, leakproof, noiseless and efficient. Prices range from $18 to $35. Victor Mfg. Co., Detroit.

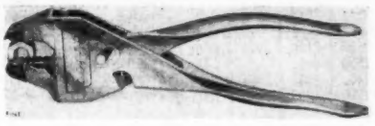
### AMERICAN DANITE

A lead alloy processed into and on the component leaves of automobile springs to provide easy riding by making the springs rust proof and self lubricating. The Temme Spring Co., 2810 S. Michigan Ave., Chicago.

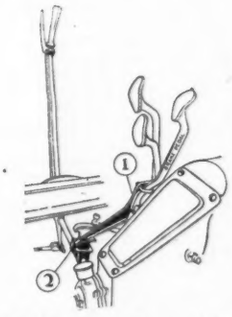



Victor exhaust heater

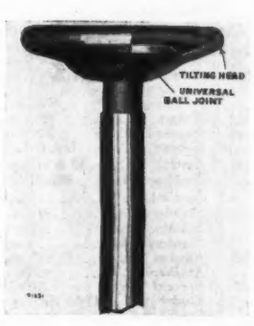
Trindl super valve H. T. S. indicator



Plierench



Double brake attachment for Fords




Brenner valve

Westinghouse air cushions

White traction lock

### TRINDL SUPER VALVE

The head of the Super Valve is made in two pieces. These valves are made of a special alloy steel which is warpproof. The grain of the metal in the head and stem run in different directions which, it is claimed, gives uniform heat radiation and therefore uniform expansion throughout the entire valve head.

The concavity of the inner surface of the valve head insures a larger space for vapor expansion and permits an easy draining of oil toward the edge of the valve, consequently scavenging the valve head of any residue. These valves are made for all makes of motors in standard and over-size stems of 1/64th and 1/32nd. The Trindl Co., 2917 S. Wabash Ave., Chicago.

### WESTINGHOUSE AIR SPRINGS

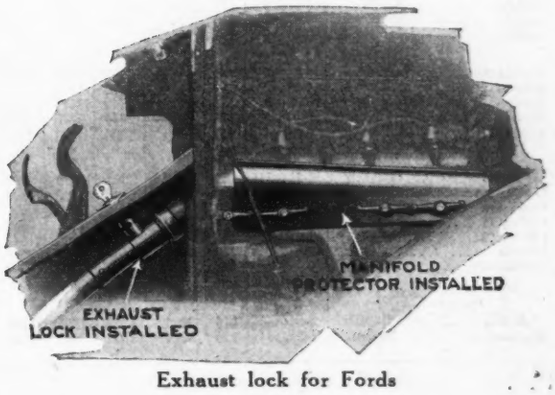
Westinghouse air springs are installed the same as shock absorbers. They are designed to give added comfort to the car in all kinds of driving. Appearance is another feature of this accessory. Westinghouse Air Spring Co., New York City.

### H. T. S. INDICATOR

The feature of the H. T. S. Indicator lies in the fact that the dial shows at all times, both day and night, the temperature of the radiator. The cut will explain the various stations at which the dial arrives. H. T. S. Indicator Co., Chester, Pa.

### BRENNER VALVES

The S Die & Tool Co., Detroit, has brought out a self-seating valve, which, at the present time, is being manufactured for Ford cars. The structure of the valve is shown in the partial sectional illustration herewith. It consists of a stamped tilting part, which is pressed over a sprung head and rests on a ball surface which gives the effect of a universal joint. It is claimed that the first few impacts of the valve upon its seat establishes a proper center. It is claimed because of the self-seating of this valve that uniformity of compression in the different cylinders is maintained with a consequent increase in smoothness of action and decrease in the amount of gasoline consumed. The valve is also claimed to require no grinding.




Exhaust lock for Fords

# Specifications of Current Passenger Car Models

| NAME AND MODEL | Engine Make | Cylinders, Bore and Stroke | WB | Tires | 2-Pass. | 5-Pass. | 7-Pass. | Coupe | Sedan |
|---|---|---|---|---|---|---|---|---|---|
| Ambassador R | Cont. | 6-3⅝x5¼ | 136 | 33x5 | .... | †4500 | $4500 | .... | $6500 |
| American C | H-S. | 6-3¼x5 | 127 | 32x4 | $2195 | 2195 | †2250 | .... | 3150 |
| Anderson Series 40 | Cont. | 6-3¼x4½ | 120 | 33x4 | 2195 | 1650 | 1795 | $2450 | 2550 |
| Apperson 8-21-S | Own. | 8-3½x5 | 130 | 34x4½ | .... | 2620 | 2645 | 3625 | 3695 |
| Auburn Beauty-Six 6-51 | Cont. | 6-3¼x4½ | 121 | 32x4 | 1575 | 1575 | 1615 | 2275 | 2395 |
| Auburn Beauty Six | Cont | 6-3¼x4½ | 121 | 32x4½ | .... | †2195 | .... | .... | .... |
| Beggs 20T | Cont. | 6-3¼x4½ | 120 | 33x4 | 1775 | 1520 | .... | 2320 | 2420 |
| Bell 4-32 | H-S. | 4-3½x5 | 114 | 31x4 | .... | 1195 | .... | .... | .... |
| Bell 6-50 | H-S. | 6-3¼x5 | 124 | 32x4 | .... | 1545 | .... | .... | .... |
| Biddle B1 & B5 | Buda. | 4-3¾x5½ | 121 | 32x4 | 2950 | †2950 | .... | 3950 | 3950 |
| Brewster 91 | Own. | 4-4 x5½ | 125 | 32x4½ | ‡6000 | 6000 | .... | .... | 9200 |
| Buick 1922-34-35-36-37 | Own. | 4-3⅜x4¾ | 109 | 31x4 | 895 | 935 | .... | 1295 | 1395 |
| Buick 1922-44-5-6-7 | Own. | 6-3⅜x4½ | 118 | 33x4§ | 1360 | 1395 | .... | 1885 | 2065 |
| Buick 1922-48-9-50 | Own. | 6-3⅜x4½ | 124 | 34x4½ | .... | .... | 1585 | 2075 | 2375 |
| Cadillac 61 | Own. | 8-3½x5½ | 132 | 33x5 | 3100 | 3150 | 3150 | 3925 | 4100 |
| Case X | Cont. | 6-3¼x4½ | 122 | 32x4½ | .... | 1890 | .... | .... | 2790 |
| Case V | Cont. | 6-3½x5¼ | 126 | 34x4½ | .... | .... | 1935 | 2585 | 2990 |
| Chalmers 6-30 | Own. | 6-3¼x4½ | 117 | 32x4 | 1245 | 1295 | 1395 | 1995 | 2295 |
| Chalmers 6-30 | Own. | 6-3¼x4½ | 122 | 32x4 | .... | .... | 1395 | .... | .... |
| Champion Tourist | Lyc. | 4-3½x5 | 113 | 32x3½ | .... | 995 | †995 | .... | .... |
| Champion Special | H-S. | 4-3½x5 | 118 | 32x4 | †1095 | 1095 | .... | .... | .... |
| Chandler Six | Own. | 6-3½x5 | 123 | 33x4 | 1595 | .... | 1695 | 2295 | 2395 |
| Chevrolet 490 | Own. | 4-3⅛x4 | 102 | 30x3½ | 525 | 525 | .... | 875 | 875 |
| Chevrolet FB | Own. | 4-3⅛x5¼ | 110 | 32x4 | 975 | 975 | .... | 1575 | 1575 |
| Cleveland 41 | Own. | 6-3 x4½ | 112 | 32x4 | 1175 | 1195 | .... | 1550 | 1595 |
| Climber Four K | H-S. | 4-3½x5 | 115 | 33x4 | 1385 | 1385 | .... | .... | .... |
| Climber Six S | H-S. | 6-3¼x5 | 125½ | 32x4½ | 2250 | zz50 | .... | 3000 | 3100 |
| Cole 890 | Nort. | 8-3½x4½ | 127¼ | 33x5 | 2485 | ‡2485 | 2485 | 3385 | 3685 |
| Columbia Challenger | Rut. | 6-3½x5 | 115 | 32x4 | .... | 1195 | .... | †1995 | 1995 |
| Columbia D-C&CS | Cont. | 6-3¼x4½ | 115 | 32x4 | 1475 | 1475 | ‡1475 | †2295 | 2350 |
| Comet C-53 | Cont. | 6-3½x5¼ | 125 | 33x4½ | .... | 2350 | 2450 | .... | 3650 |
| Crawford 22-6-40 | Cont. | 6-3½x5¼ | 122½ | 32x4 | 2750 | 2750 | 2750 | .... | 4500 |
| Crow-Elkhart L63-65 | Lyc. | 4-3½x5 | 117 | 32x3½ | †1095 | 1095 | .... | .... | .... |
| Crow-Elkhart S63-65 | H-S. | 6-3¼x5 | 117 | 33x4 | 1345 | 1345 | .... | .... | 2095 |
| Daniels D-19 | Own. | 8-3½x5¼ | 132 | 34x4¼ | ‡5350 | ‡5350 | 5350 | 6250 | 6950 |
| Davis 61-67 | Cont. | 6-3¼x4½ | 120 | 33x4 | †1895 | 1795 | †1895 | 2595 | 2595 |
| Dixie Flyer H-S-70 | H-S. | 4-3½x5 | 112 | 32x4 | 1195 | 1195 | ‡1395 | 1895 | 1895 |
| Dodge Brothers | Own. | 4-3⅞x4½ | 114 | 32x4 | 850 | 880 | .... | 1280 | 1440 |
| Dorris 6-80 | Own. | 6-4 x5 | 132 | 33x5 | *.... | ‡4785 | 4785 | 5800 | 7190 |
| Dort 19-14 | D-Ly. | 4-3½x5 | 108 | 31x4 | 865 | 865 | .... | 1315 | 1445 |
| Driggs | Own. | 4-2⅝x4½ | 104 | 30x3½ | 1275 | 1275 | .... | .... | 1975 |
| Duesenberg Straight 8 | Own. | 8-2⅞x5 | 134 | 33x5 | 6500 | 6500 | 6750 | 7800 | 7800 |
| Du Pont A | Own. | 4-3⅛x5½ | 124 | 32x4½ | 3000 | 3200 | .... | 3800 | 4000 |
| Durant A-22 | Own. | 4-3⅞x4½ | 106 | 31x4 | .... | 890 | .... | 1365 | 1365 |
| Durant B-22 | Anst. | 6-3¼x4½ | 123 | 32x4½ | 1600 | 1650 | .... | 2250 | 2400 |
| Earl 40 | Own. | 4-3⅞x5¼ | 112 | 32x4 | 1485 | 1185 | .... | .... | 1895 |
| Elcar K-4 | Lyc. | 4-3½x5 | 118 | 33x4 | 1095 | 1095 | ‡1095 | 1345 | .... |
| Elcar 7-R | Cont. | 6-3¼x4½ | 118 | 33x4 | 1395 | 1395 | ‡1395 | 2065 | 2165 |
| Elgin K-1 | Falls. | 6-3¼x4¼ | 118 | 33x4 | 1345 | 1295 | ‡1345 | 2195 | 2195 |
| Essex | Own. | 4-3½x5 | 108½ | 32x4 | 1095 | 1095 | .... | 1345 | 1895 |
| Falcon 4 | Own. | 4-3½x5 | 115 | 32x4 | 1295 | 1295 | .... | 1990 | 2085 |
| Falcon 6 | Own. | 6-3½x5 | 115 | 32x4 | 1595 | 1595 | .... | 2295 | 2395 |
| Falcon, H.P.M. 12-D22 | Own. | 4-2¾x4 | 100 | 27x3½ | 2800 | †3000 | .... | .... | 4000 |
| Ferris Series 60 | Cont. | 6-3½x5¼ | 130 | 32x4½ | 2575 | .... | 2475 | .... | 3475 |
| Ferris Series70 | Cont. | 6-3½x5¼ | 130 | 32x4½ | 2895 | .... | 2795 | .... | 3895 |
| Ford T | Own. | 4-3⅜x4 | 100 | 30x3½ | **319 | ††348 | .... | 580 | 645 |
| Franklin 9-B | Own | 6-3¼x4 | 115 | 32x4 | 2400 | 2450 | .... | 3200 | 3450 |
| Gardner T-R & G | Lyc. | 4-3½x5 | 112 | 32x3½ | 895 | 895 | .... | .... | 1595 |
| Goodspeed | Own. | 4-3⅝x5½ | 124 | 32x4½ | .... | 5400 | .... | .... | .... |
| Grant | Own. | 6-3½x4½ | 116 | 32x4 | 1385 | 1385 | .... | 1945 | 1895 |
| H.C.S. | Weid. | 4-3½x5½ | 120 | 32x4½ | 2725 | †2775 | .... | 3450 | 3650 |
| Handley-Knight | Kn'ht. | 4-4½x4½ | 125 | 32x4½ | .... | .... | 2650 | 3750 | 3750 |
| Hanson Six 60 | Cont. | 6-3¼x4½ | 121 | 32x4 | 1595 | 1595 | 1795 | †2475 | 2585 |
| Hatfield A-42 | H-S. | 4-3½x5 | 115 | 32x4 | †1345 | 1345 | .... | 1950 | 1950 |
| Haynes 75 | Own. | 6-3½x5½ | 132 | 34x4½ | 2595 | †2395 | 2395 | .... | 3395 |
| Haynes 55 | Own. | 6-3½x5 | 121 | 33x4 | 1645 | 1595 | .... | 2295 | 2595 |
| Haynes 48 | Own. | 12-2¾x5 | 132 | 34x4½ | 4200 | 3635 | 3635 | .... | 4950 |
| Helmes Series 4 | Own. | 6-3½x4¼ | 126 | 34x4½ | †2950 | .... | 2950 | 3850 | 4150 |
| Hudson Super 6 | Own. | 6-3½x5 | 126 | 34x4½ | †1695 | .... | 1745 | 2570 | 2650 |
| Huffman R | Cont. | 6-3¼x4½ | 120 | 32x4 | 1845 | 1795 | .... | .... | 2795 |
| Hupmobile Series R | Own. | 4-3¼x5½ | 112 | 32x4 | 1250 | 1250 | .... | 1835 | 1935 |
| Jackson 638 | H-S. | 6-3¼x5 | 121 | 32x4½ | †2285 | 1635 | .... | 2985 | 2985 |
| Jordan MX | Own. | 6-3⅛x4¾ | 120 | 32x4 | 2095 | 2095 | .... | 3200 | 3200 |
| Jordan F | Cont. | 6-3½x5¼ | 127 | 32x4½ | .... | .... | 2475 | .... | 3500 |
| Kenworthy 8-90 | Own. | 8-3 x5¼ | 13? | 32x4½ | 5000 | 5000 | 5250 | 6000 | 6000 |
| Kessler K | Own. | 4-3⅜x3¾ | 117 | 32x4 | .... | 1995 | .... | .... | 2445 |
| King K-1922 | Own. | 8-3 x5 | 120 | 32x4½ | 2140 | †2125 | *2125 | 3125 | 3235 |
| Kissel 45 | Own. | 6-3⅛x5½ | 124 | 32x4½ | 2675 | 2675 | 2175 | 3275 | 3475 |
| Kline Kar 6-55-K | Cont. | 6-3¼x4½ | 121 | 33x4 | 1890 | 1790 | 1790 | 2850 | 2890 |
| LaFayette 134 | Own. | 8-3½x5¼ | 132 | 33x5 | 3985 | 4090 | 4090 | 5000 | 5175 |
| Leach 999 | Own. | 6-3¼x5½ | 134 | 32x4½ | 6500 | 6500 | 6500 | 6500 | 6500 |
| Lexington Series S | Anst. | 6-3¼x4½ | 122 | 32x4 | .... | 1985 | .... | .... | 2285 |
| Lexington Series T | Anst. | 6-3¼x4½ | 128 | 32x4½ | .... | .... | 2785 | .... | 3750 |
| Liberty 10-D | Own. | 6-3½x5 | 117 | 33x4½ | 1295 | 1295 | †1345 | 2085 | 2245 |
| Lincoln | Own. | 8-3⅜x5 | 136 | 33x5 | †3800 | 3300 | 3300 | 3900 | 4200 |
| Locomobile 48 | Own. | 6-4½x5½ | 142 | 35x5 | .... | †7600 | 7600 | 10500 | 11000 |
| Maibohm B | Falls. | 6-3⅛x4½ | 116 | 32x4 | 1395 | 1395 | †1495 | 2165 | 2165 |
| Marmon 34 | Own. | 6-3⅞x5⅛ | 136 | 32x4½ | †3700 | 3900 | 3700 | 4700 | 5150 |
| Maxwell | Own. | 4-3⅝x4½ | 109 | 31x4 | $ 885 | $ 885 | .... | $1385 | $1485 |
| McFarlan 1921 | Own. | 6-4½x6 | 140 | 33x5 | 6300 | †6300 | $6300 | 7500 | 7500 |
| Mercer Series 5 | Own. | 4-3¾x6¾ | 132 | 32x4½ | 3950 | †3950 | *3950 | 4850 | 5250 |
| Merit | Cont. | 6-3¼x4½ | 119 | 32x4 | †1985 | 1985 | .... | .... | .... |
| Meteor R & RR | Dues. | 4-4½x6 | 129 | 32x4½ | 5500 | 5500 | .... | .... | .... |
| Mitchell F-50 | Own. | 6-3½x5 | 120 | 33x4 | ‡1490 | 1490 | †1790 | 2290 | 2440 |
| Mitchell F-50 | Own. | 6-3½x5 | 127 | 33x4 | .... | .... | 1795 | .... | .... |
| Monroe 1922-S-13 | Own. | 4-3¼x4½ | 115 | 32x3½ | 1295 | 1295 | .... | .... | .... |
| Monroe 1922-S-14 | Own. | 4-3¼x4½ | 115 | 33x4 | .... | .... | .... | 2075 | 2175 |
| Moon 6-48 | Cont. | 6-3¼x4½ | 122 | 32x4 | 1785 | 1785 | 2285 | 2785 | 2785 |
| Moon 6-68 | Cont. | 6-3½x5¼ | 125 | 32x4½ | .... | .... | 2285 | .... | .... |
| Murray-Mac Six | Own. | 6-3½x5¼ | 128 | 34x4½ | 4250 | 4250 | 4250 | .... | .... |
| Nash 681-7 | Own. | 6-3¼x5 | 121 | 33x4 | 1360 | 1390 | †1540 | .... | .... |
| Nash 682 | Own. | 6-3¼x5 | 127 | 34x4½ | .... | .... | 1540 | 2090 | 2390 |
| Nash Four 41-4 | Own. | 4-3⅜x5 | 112 | 33x4 | 965 | 985 | .... | 1485 | 1645 |
| National BB | Own. | 6-3½x5¼ | 130 | 32x4½ | 2750 | †2750 | 2750 | 3890 | 3990 |
| Noma 3C | Bea. | 6-3¼x4½ | 128 | 32x4½ | 2000 | †2100 | *2200 | .... | 3200 |
| Noma 1D | Cont. | 6-3½x5¼ | 128 | 32x4½ | 3000 | †3100 | *3200 | .... | §5500 |
| Norwalk 430-KS | Lyc. | 4-3½x5 | 116 | 32x3½ | .... | 1035 | .... | .... | .... |
| Oakland 6-44 | Own. | 6-2¾x4¾ | 115 | 32x4 | 1120 | 1145 | ††1265 | 1685 | 1785 |
| Ogren 6 T De Luxe | Cont. | 6-3½x5¼ | 134 | 33x5 | ‡4250 | 4250 | 4350 | 5200 | 5500 |
| Oldsmobile 43-A | Own. | 4-3¼x5¼ | 115 | 32x4 | ‡1145 | 1145 | .... | 1645 | 1795 |
| Oldsmobile 46 | Own. | 8-2⅞x4¾ | 122 | 33x4½ | .... | †1735 | 1735 | .... | 2635 |
| Oldsmobile 47 | Own. | 8-2⅞x4½ | 115 | 32x4 | 1595 | †1595 | .... | 2145 | 2295 |
| Overland 4 | Own. | 4-3⅜x4 | 100 | 30x3½ | 595 | 595 | .... | 850 | 895 |
| Packard Single-Six | Own. | 6-3⅜x4½ | 116 | 33x4½ | 2350 | 2350 | .... | 3125 | 3350 |
| Packard Twin Six | Own. | 12-3 x5 | 136 | 35x5 | 3850 | 3850 | 3850 | 5240 | 5400 |
| Paige 6-44 | Own. | 6-3¼x5 | 119 | 32x4 | 1465 | 1465 | .... | 1995 | 2245 |
| Paige 6-66 | Cont. | 6-3⅜x5 | 131 | 33x4½ | ‡2245 | ‡2495 | 2195 | 3100 | 3155 |
| Pan American 6-55 | H-S. | 6-3¼x5 | 121 | 33x4 | 2000 | 2000 | 2100 | .... | .... |
| Paterson 22-6-52 | Cont. | 6-3¼x4½ | 120 | 32x4½ | .... | 1550 | 1585 | 2595 | 2595 |
| Peerless 56-S-7 | Own. | 8-3⅜x5 | 125 | 34x4½ | .... | ‡2790 | 2790 | 3500 | 3790 |
| Piedmont 4-30 | Lyc. | 4-3½x5 | 116 | 32x3½ | .... | 970 | .... | .... | .... |
| Piedmont 6-40 | Cont. | 6-3⅝x4½ | 122 | 32x4 | .... | 1285 | .... | .... | .... |
| Pierce-Arrow | Own. | 6-4 x5½ | 138 | 33x5 | 7000 | ‡6500 | 6500 | 8000 | 8500 |
| Pilot 6-50 | H-S. | 6-3¼x5 | 126 | 32x4½ | 2050 | 2000 | 2050 | 2950 | 3000 |
| Porter 46 | Own. | 4-4 x6⅜ | 142 | 35x5 | 6750 | 6750 | 6750 | .... | 7800 |
| Premier 6-D | Own. | 6-3⅝x5½ | 126¾ | 33x5 | 3150 | †3100 | 3250 | .... | 5000 |
| Premocar 6-40 A | Falls. | 6-3½x4¼ | 117 | 32x4 | 1295 | 1295 | .... | 1945 | 1995 |
| R & V Knight R | Own. | 4-3¾x5 | 116 | 32x4 | .... | 1850 | .... | 2650 | 2750 |
| R & V Knight J | Own. | 6-3½x5¼ | 127 | 32x4½ | 2750 | 2750 | 2750 | 3350 | 3450 |
| Reo Series B-T6 & U6 | Own. | 6-3⅜x5 | 120 | 33x4 | 1595 | .... | 1595 | 2355 | 2435 |
| ReVere C | Dues. | 4-4¼x6 | 131 | 32x4½ | 3200 | 3200 | 3200 | .... | 4000 |
| Rickenbacker | Own. | 6-3½x3¾ | 117 | 32x4 | .... | 1485 | *.... | 1885 | 1985 |
| Roamer 6-54-E | Cont. | 6-3½x5¼ | 128 | 32x4½ | 2850 | 2585 | †2750 | 3850 | 3850 |
| Roamer 4-75-E | Dues. | 4-4¼x6 | 128 | 32x4½ | 3985 | ‡3585 | ‡3750 | .... | ‡4650 |
| Rolls-Royce | Own. | 6-4½x4¾ | 143½ | 33x5 | U. S. | Chassis | Price | ††1750 | .... |
| Romer R-22 | Cont. | 6-3¼x4½ | 120 | 33x4 | 1975 | 1975 | 2050 | 2400 | 2700 |
| Saxon 125 | Own. | 4-3½x5 | 112 | 32x4 | 1195 | 1195 | .... | 1795 | 1795 |
| Sayers Six DP | Cont. | 6-3¼x4½ | 118 | 33x4 | 1695 | 1695 | .... | 2795 | 2795 |
| Seneca L & O | LeR. | 4-3¼x4½ | 108 | 30x3½ | 945 | 945 | .... | .... | .... |
| Seneca 50 & 51 | Lyc. | 4-3½x5 | 112 | 31x4 | 1095 | 1095 | .... | .... | .... |
| Southern Six 660-2 | H-S. | 6-3¼x5 | 127 | 32x4½ | 2375 | 2375 | 2395 | .... | .... |
| Sperling, A | Supr. | 4-3⅜x5 | 114 | 32x4 | 980 | 980 | .... | 1685 | 1685 |
| Standard J | Own. | 8-3¼x5 | 127 | 34x4½ | 2500 | †2500 | 2500 | 3250 | 3500 |
| Stanley Steamer | Own. | 2-4 x5 | 130 | 34x4½ | 2800 | 2600 | 2600 | 3775 | 3850 |
| Stanwood Six | Cont. | 6-3¼x4½ | 118 | 33x4 | 1765 | 1765 | .... | 2750 | .... |
| Stearns SKL4 | Own. | 4-3⅜x5⅝ | 125 | 34x4½ | 2250 | 2250 | 2450 | 3150 | 3450 |
| Stephens 90 | Own. | 6-3¼x4½ | 122 | 33x4½ | 1675 | †1745 | *1745 | 2650 | 2650 |
| Stevens-Duryea E | Own. | 6-4¼x5½ | 138 | 35x5 | 7250 | †6900 | 6800 | .... | ††8900 |
| Studebaker Light Six | Own. | 6-3½x4½ | 112 | 32x4 | 1045 | 1045 | .... | 1375 | 1750 |
| Studebaker Special Six | Own. | 6-3½x5 | 119 | 32x4 | 1425 | 1475 | ††1475 | 2150 | 2350 |
| Studebaker Big Six | Own. | 6-3⅞x5 | 126 | 33x4½ | .... | .... | 1785 | 2500 | 2700 |
| Stutz | Own. | 4-4⅜x6 | 130 | 32x4½ | 2950 | †2990 | *2990 | 3990 | 4450 |
| Templar A-445 | Own. | 4-3⅜x5½ | 118 | 32x4 | 1985 | 1985 | .... | 2785 | 2785 |
| Texan A-38 | Lyc. | 4-3½x5 | 115 | 33x4 | 1195 | 1195 | .... | .... | .... |
| Texan C-12 | H-S. | 4-3½x5 | 115 | 33x4 | 1350 | 1350 | .... | .... | .... |
| Tulsa E-1-2-3 | H-S. | 4-3½x5 | 117 | 33x4 | 1175 | 1175 | .... | .... | .... |
| Tulsa F-1 | H-S. | 6-3¼x5 | 119 | 33x4 | 1585 | 1585 | .... | .... | .... |
| Velie 48 | Cont. | 6-3¼x4½ | 115 | 32x4 | 1585 | 1585 | †1800 | 2485 | 2485 |
| Velie 34 | Falls. | 6-3½x4½ | 112 | 32x3½ | 1235 | 1235 | .... | 1750 | 2085 |
| Velie 58 | Own. | 6-3½x4¼ | 115 | 32x4 | 1395 | 1395 | .... | 2085 | 2085 |
| Vogue 6-55 | H-S. | 6-3¼x5 | 124 | 32x4 | .... | 1885 | 1960 | 2785 | 2885 |
| Vogue 6-66 | Cont. | 6-3½x5¼ | 124 | 33x4½ | .... | 2085 | 2160 | 2885 | 2985 |
| Waltham 6 | Own. | 6-3¼x5 | 120 | 32x4 | 2350 | .... | 2350 | 3050 | 3150 |
| Washington | Cont. | 6-3¼x4½ | 116 | 32x4 | .... | 1785 | .... | .... | .... |
| Washington Jr. | Falls. | 6-3½x4¼ | 116 | 32x4 | .... | 1635 | .... | .... | .... |
| Westcott C-48 | Cont. | 6-3½x5¼ | 125 | 32x4½ | .... | 2090 | 2090 | .... | 3490 |
| Westcott A-44 | Cont. | 6-3¼x4½ | 120 | 32x4 | 1890 | 1890 | ‡2190 | 2890 | 2890 |
| Wills Sainte Claire A-68 | Own. | 8-3¼x4 | 121 | 32x4½ | 2475 | 2475 | .... | 3275 | 3475 |
| Willys-Knight 20 | Own. | 4-3⅜x4½ | 118 | 33x4 | 1475 | 1525 | .... | 2195 | 2395 |
| Winther 61 | H-S. | 6-3¼x5 | 120 | 32x4½ | .... | .... | 2250 | .... | .... |
| Winton 40 | Own. | 6-3¾x5¼ | 132 | 35x5 | 3400 | †3600 | 3400 | 4450 | 4550 |

*—6-passenger. †—4-passenger. ‡—3-passenger. **—Price without starter and demountable rims. Price with starter and demountable rims $414. ††—Price without starter and demountable rims. Price with starter and demountable rims $443.

**Engine Make:** Anst—Ansted. Bea—Beaver. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming. Dues—Duesenberg. H-S—Herschell-Spillman. LeR—Leroy. Lyc—Lycoming. Nort—Northway. Roch—Rochester. Rut—Rutenberg. Weid—Weidely. Wisc—Wisconsin.
§Model 47—34 x 4½ Tires.

# Specifications of Current Motor Truck Models

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES Front | TIRES Rear | Final Drive |
|---|---|---|---|---|---|---|
| Acason | ¾ | $1650§ | 3¾x5 | 34x5† | 34x5† | W |
| Acason, R | 1 | 2260 | 3¾x5¼ | 36x3½ | 36x5 | W |
| Acason, RB | 1½ | 2485 | 3¾x5¼ | 36x3½ | 36x6 | W |
| Acason, H | 2½ | 3295 | 4⅜x5¾ | 36x4* | 36x8* | W |
| Acason, L | 3½ | 4295 | 4⅜x5¾ | 36x5* | 36x10* | W |
| Acason, M | 5 | 5250 | 5 x6¼ | 36x6 | 40x12 | W |
| Ace, C | 1½ | 2295 | 3¾x5⅛ | 34x3½* | 34x5* | W |
| Ace, A | 2½ | 2795 | 4¼x5½ | 36x4* | 36x7 | W |
| Acme, G | ¾ | .... | 3¾x5 | 35x5† | 35x5† | W |
| Acme, B | 1 | .... | 3¾x5 | 34x3½ | 34x5 | W |
| Acme, F | 1½ | .... | 3¾x5 | 34x3½ | 34x5 | W |
| Acme, A | 2½ | .... | 4⅜x5¼ | 36x4 | 36x7 | W |
| Acme, AC | 2½ | .... | 4½x5½ | 36x4 | 36x7* | W |
| Acme, C | 3½ | .... | 4½x5½ | 36x5 | 40x10 | W |
| Acme, E | 5 | .... | 4¾x6 | 36x6 | 40x12 | W |
| Akr'nMulti-Trk20 | 1¼ | 1695 | 4 x5¼ | 34x5 | 34x5 | B |
| American, 25 | 2½ | 3350 | 4 x6 | 36x4* | 36x4d* | W |
| American, 40 | 4 | 4275 | 4½x6 | 36x5* | 36x5d* | W |
| Apex, G | 1 | 1450†† | 3½x5 | 33x5† | 33x5† | I |
| Apex, D | 1½ | 1915 | 3¾x5¼ | 34x3½ | 34x4 | I |
| Apex, E | 2½ | 2695 | 4¼x5½ | 36x4 | 36x7 | I |
| Anex, F | 3½ | 3975 | 4½x6 | 36x5 | 36x10 | I |
| Armleder, 20 | 1 | .... | 3¾x5¼ | 34x3½* | 34x5* | W |
| Armleder, 21 | 1½ | .... | 3¾x5¼ | 34x3½ | 34x6 | W |
| Armleder, 21 | 1½ | .... | 3¾x5¼ | 34x3½ | 34x6 | W |
| Armleder, 40 | 1½ | .... | 4¼x5¼ | 34x3½ | 34x6 | W |
| Armleder, 40 | 1½ | .... | 4½x5¼ | 34x3½ | 36x6 | W |
| Armleder, HW | 2½ | .... | 4¼x5½ | 36x4* | 36x7* | W |
| Armleder, KW | 3½ | .... | 4½x6 | 36x5 | 36x5d | W |
| Atco, B | 1½ | .... | 3¾x5¼ | 34x5† | 36x6† | W |
| Atco, B1 | 1½ | .... | 3¾x5¼ | 34x5† | 36x6† | I |
| Atco, A | 2½ | .... | 4¼x5½ | 36x4† | 36x8* | W |
| Atlas, M.D. | 1 | 1185 | 3½x5 | 32x4½† | 32x4½† | W |
| Atterbury, 20R | 1½ | 2475 | 3¾x5 | 34x3½ | 34x5 | W |
| Atterbury, 7CX | 2½ | 3175 | 4¼x5¼ | 36x4 | 36x4d | W |
| Atterbury, 7D | 3½ | 3975 | 4½x5½ | 36x5 | 40x5d | W |
| Atterbury, 8E | 5 | 4975 | 4⅜x6 | 36x5 | 40x6d | W |
| Autocar, 21UF | 1¼-2 | 1950 | 4⅜x4½ | 34x4* | 34x5* | D |
| Autocar, 21UG | 1¼-2 | 2050 | 4⅜x4½ | 34x4* | 34x5* | D |
| Autocar, 27H | 2 | 2950 | 4 x5½ | 34x5 | 36x7 | D |
| Autocar, 26Y | 5 | 3950 | 4¼x5½ | 34x6 | 36x12 | D |
| Autocar, 26-B | 5 | 4100 | 4¼x5½ | 34x6 | 36x12 | D |
| Available, H1½ | 1½ | 2475 | 4 x5⅛ | 36x3½* | 36x5* | W |
| Available, H2 | 2 | 2775 | 4 x5⅛ | 36x3½* | 36x6* | W |
| Available, H2½ | 2½ | 3160 | 4 x5⅛ | 36x4* | 36x8* | W |
| Available, H3½ | 3½ | 4175 | 4½x5½ | 36x5 | 40x5d | W |
| Available, H5 | 5 | 5375 | 4⅜x6 | 36x6 | 40x12 | W |
| Avery | 1 | .... | 3 x4 | 34x5† | 34x5† | I |
| Beck, A Jr. | 1 | 1950 | 3⅜x5 | 34x3½ | 34x4 | I |
| Beck, C | 2 | 2550 | 4½x5¼ | 36x4 | 36x6 | I |
| Bell, M | 1 | 1495 | 3½x5⅛ | 35x5 | 35x5† | W |
| Bell, E | 1½ | 2100 | 3¾x5¼ | 34x3½ | 34x5 | I |
| Bell, O | 2½ | 2550 | 4½x5½ | 34x4 | 34x6 | I |
| Belmont, A | ½ | 725 | 3½x4¼ | 31x4 | 31x4 | B |
| Belmont, D | 2 | 2575 | 4½x5½ | 34x3½* | 34x6* | I |
| Belmont, F | 3 | 3500 | 4 x6 | 36x5* | 36x5d* | I |
| Bessemer, G | 1 | 1395 | 3½x5 | 35x5† | 35x5† | I |
| Bessemer, H-2 | 1½ | 1995 | 3¾x5 | 36x3½ | 36x5 | I |
| Bessemer, J-2 | 2½ | 2595 | 4¼x5¼ | 36x4 | 36x4d | I |
| Bessemer, K-2 | 4 | 3495 | 4½x5½ | 36x5 | 36x10 | I |
| Big 4, H | 3½-4 | 5000 | 4½x6 | 36x6 | 36x6 | W |
| Big 4, T | 4 | 5500 | 4⅜x6 | 36x6 | 36x6 | W |
| Big 4, K | 7 | 6000 | 5½x6 | 36x6 | 36x6 | W |
| Big 4, HA | 7 | 6000 | 4½x6 | 36x6 | 36x10 | W |
| Brinton, C | 1½ | 1500 | 3⅜x5 | 34x4 | 34x5 | W |
| Brinton, D | 2½ | 2250 | 4⅜x5¼ | 36x4 | 36x7 | W |
| Brockway, E | 1 | .... | 3¾x5⅛ | 35x5† | 35x5† | B |
| Brockway, S-5 | 1½ | .... | 3¾x5 | 36x3½* | 36x5* | W |
| Brockway, SK | 1½ | .... | 4¼x5¼ | 36x4 | 36x6 | |
| Brockway, KR | 2½ | .... | 4½x5½ | 36x4 | 36x8 | |
| Brockway, K-5 | 2½ | .... | 4½x5½ | 36x4 | 36x8 | W |
| Brockway, RT | 3½ | .... | 4⅜x6 | 36x5 | 36x10 | |
| Brockway, R-4 | 3½ | .... | 4½x5½ | 36x5 | 36x5d | W |
| Brockway, T-4 | 5 | .... | 4⅜x6 | 36x6 | 40x6d | W |
| Capitol, G1½ | 1½ | 2975 | 3¾x5 | 35x5 | 38x7 | W |
| Capitol, H2½ | 2½ | 3700 | 4¼x6 | 36x4 | 36x8 | W |
| Capitol, K2½ | 2½ | 4250 | 4¼x6 | 36x6 | 42x9 | W |
| Capitol, M3½ | 3½ | 4425 | 4¼x6 | 36x5 | 36x10 | W |
| Case | 2 | .... | 4¼x5¾ | 36x6 | 38x7 | I |
| Champion Light Commercial | ½ | 1195 | 3½x5 | 32x3½ | 32x3½ | I |
| Chevrolet, G | ¾ | 745 | 3½x4 | 31x4† | 34x4½† | B |
| Chevrolet, T | 1 | 1125 | 3½x5¼ | 33x4† | 35x5† | W |
| Chicago, C1½ | 1½ | .... | 3¾x5½ | 36x3½* | 36x5* | W |
| Chicago, C2½ | 2½ | .... | 4 x5½ | 36x4* | 36x7* | W |
| Chicago, C3½ | 3½ | .... | 4½x5½ | 36x5 | 36x10 | W |
| Chicago, D5 | 5 | .... | 4½x5½ | 36x6 | 40x12 | W |
| Climber, A-20 | 1½ | 2450 | 3½x5 | 36x6* | 38x7* | I |
| Clydesdale, 18 | ¾ | 1890 | 3¾x5 | 34x5 | 34x5 | W |
| Clydesdale, 32C | 1 | 2375 | 3¾x5½ | 34x3½* | 34x5* | W |
| Clydesdale, 42C | 1½ | 2475 | 4 x5½ | 36x3½ | 36x5 | W |
| Clydesdale, 65C | 2½ | 3250 | 4¾x5½ | 36x4 | 36x7 | W |
| Clydesdale, 65EC | 2½ | 3450 | 4½x5½ | 36x4 | 36x7 | W |
| Clydesdale, 90C | 3½ | 4100 | 4½x5½ | 36x5 | 40x10 | W |
| Clydesdale, 120C | 5 | 4500 | 4½x6 | 36x6 | 40x12 | W |
| Collier, 18 | 1 | 2350 | 3¾x5 | 34x4 | 34x5 | W |
| Collier, 19 | 1½ | 2550 | 3¾x5 | 36x4 | 36x6 | W |
| Collier, 21 | 2 | 2950 | 4¼x5¼ | 36x4 | 36x7 | W |
| Collier, 22 | 2½ | 3250 | 4¼x5¼ | 36x4 | 36x4 | W |
| Columbia, H | 1½ | 1875 | 3¾x5 | 34x3½ | 34x5 | I |
| Columbia, G | 2½ | 2335 | 4 x5¼ | 36x4 | 36x7 | I |
| Comet T | 1½ | 1950 | 3¾x5 | 34x4 | 34x4 | W |
| Commerce, T | ¾-1¼ | 1450 | 3¾x5 | 34x4½† | 34x4½† | B |
| Commerce, 12 | 1½ | 1800 | 3¾x5 | 35x5† | 35x5† | I |
| Commerce, 16 | 2 | 2150 | 3¾x5 | 35x5† | 35x6† | I |
| Commerce, 18 | 2½ | $2495 | 4⅛x5¼ | 36x6† | 36x7† | I |
| Concord, A | 2 | 3150 | 4 x5½ | 36x3½ | 36x6 | W |
| Concord, B | 3 | 3600 | 4¼x5½ | 36x4 | 36x8 | W |
| Concord, AX | 2 | 3250 | 4 x5½ | 36x3½ | 36x6 | W |
| Concord, BX | 3 | 3600 | 4½x5½ | 36x4 | 36x8 | W |
| Cook, 51 | 2½ | 3500 | 4 x5⅛ | 36x6† | 40x8† | I |
| Corbitt, H-22 | 1 | 1480 | 3¾x5 | 34x3½ | 34x4 | W |
| Corbitt, E-22 | 1½ | 2200 | 3¾x5 | 34x3½ | 34x4 | W |
| Corbitt, C-22 | 2 | 2600 | 4⅛x5¼ | 36x3½ | 36x6 | W |
| Corbitt, B-22 | 2½ | 3000 | 4⅛x5¼ | 36x4 | 36x7 | W |
| Corbitt, R-22 | 3 | 3200 | 4½x5½ | 36x4 | 36x8 | W |
| Corbitt, A-22 | 3½-4 | 3800 | 4½x5½ | 36x5 | 36x10 | W |
| Corbitt, AA-22 | 5 | 4500 | 4¾x6 | 36x6 | 40x6d | W |
| Day-Elder, AS | 1 | 1600 | 3¾x5 | 35x5† | 35x5† | W |
| Day-Elder, B | 1½ | 2000 | 3¾x5 | 34x3½ | 34x5 | W |
| Day-Elder, D | 2 | 2400 | 4¼x5¼ | 36x4 | 36x7 | W |
| Day-Elder, C | 2½ | 2750 | 4¼x5½ | 36x4 | 36x7 | W |
| Day-Elder, F | 3½ | 3150 | 4½x5½ | 36x5 | 36x5d | W |
| Day-Elder, E | 5 | 4250 | 4½x6 | 36x5* | 40x6d* | W |
| Dearborn, E | 1 | 1600 | 3⅝x5½ | 35x5 | 35x5 | W |
| Dearborn, FX | 1½ | 2300 | 3¾x5⅛ | 34x4 | 34x5 | W |
| Dearborn, F | 1½ | 2180 | 3¾x5⅛ | 34x4 | 34x5 | W |
| Dearborn, 48 | 2 | 2590 | 3¾x5⅛ | 34x4½ | 34x7 | W |
| Defiance, G | 1 | 1695§ | 3¾x5 | 35x5† | 35x5† | B |
| Defiance, D | 1½ | 2095§ | 3¾x5 | 35x5† | 36x6† | I |
| Defiance, E | 2 | 2275§ | 3¾x5 | 35x5† | 38x7† | I |
| DeMartini, 1½ | 1½ | 2600 | 3¾x5 | 34x3½ | 34x6 | W |
| DeMartini, 2 | 2 | 3300 | 4 x5½ | 36x3½ | 36x7 | W |
| DeMartini 3 | 3 | 4250 | 4¼x5½ | 36x4 | 36x10 | W |
| DeMartini 4 | 4 | 4800 | 4½x6 | 36x5 | 36x12 | W |
| Denby, 31 | 1¼ | 1485 | 3½x5 | 35x5† | 35x5† | B |
| Denby, 33 | 1½ | 2145 | 3¾x5 | 35x5† | 38x7† | I |
| Denby, 34 | 2 | 2395 | 3¾x5 | 36x3½ | 36x6 | I |
| Denby, 35 | 2½-3 | 2795 | 4¼x5¼ | 36x4 | 36x7 | I |
| Denby, 27 | 4 | 3895 | 4½x5½ | 36x5 | 36x5d | I |
| Denby, 210 | 5 | 4295 | 4½x5½ | 36x6 | 40x6d | I |
| Dependable, A | ¾-1 | 1650 | 3⅝x5½ | 34x5 | 36x6 | W |
| Dependable, C | 1½ | 2350 | 3¾x5¼ | 34x3½ | 34x5 | W |
| Dependable, D | 2 | 2650 | 4 x5½ | 34x5 | 36x6 | W |
| Dependable, E | 2½ | 2950 | 4¼x5½ | 36x4 | 36x7 | W |
| Dependable, G | 3½ | 3550 | 4½x6 | 36x6 | 38x7 | W |
| Diamond T, O- 3 | 1-1¼ | 1975 | 3¾x5¼ | 36x3½† | 36x4† | W |
| Diamond T, FS | 1½ | 2525 | 3¾x5¼ | 36x3½ | 36x5 | W |
| Diamond T, T | 1½ | 2250 | 3¾x5¼ | 36x3½ | 36x5 | W |
| Diamond T, U | 2 | 2650 | 4 x5¼ | 36x4 | 36x7 | W |
| Diamond T, K | 3½ | 3750 | 4¼x5½ | 36x5 | 36x5d | W |
| Diamond T, EL | 5 | 4325 | 4½x5½ | 36x6 | 40x6d | W |
| Diamond T, S | 5 | 4500 | 4⅜x6 | 36x6 | 40x6d | W |
| Diehl, A | 1 | .... | 3½x5 | 34x4½ | 35x5 | I |
| Diehl, B | 1½ | .... | 3½x5 | 36x6 | 36x6 | I |
| Dispatch, F | 1 | 1350 | 3¾x5 | 34x4† | 34x4† | I |
| Doane | 2½ | 4100†† | 4⅜x5¾ | 36x5 | 36x7 | C |
| Doane | 3½ | 5100†† | 4⅜x5¾ | 36x5 | 36x5d | C |
| Doane | 6 | 6000†† | 5 x6¼ | 36x6 | 40x6d | C |
| Dodge Brothers | ½ | 885 | 3⅞x4½ | 32x4† | 32x4† | B |
| Dorris, K-4 | 2-2½ | 3400 | 4¼x5½ | 36x4 | 36x7 | W |
| Dorris, K-7 | 3½ | 4400 | 4¼x5½ | 36x5 | 36x10 | W |
| Dort, 103 | ½ | 685 | 3½x5 | 31x4 | 31x4 | B |
| Double Drive B | 3 | 4000 | 4¼x5½ | 6 | 6 | W |
| Duplex, A | 1½ | 2775 | 4 x5¼ | 35x5† | 38x7† | W |
| Duplex, E | 3½ | 4250 | 4½x5½ | 36x8 | 36x8 | I |
| Duty, 22 | 2 | 1590 | 3½x5 | 34x3½ | 34x5 | I |
| Eagle, 100-X | 1½ | .... | 3⅝x5⅛ | 34x5 | 34x5 | I |
| Eagle, 100-2 | 2 | 2275 | 3¾x5¼ | 34x4* | 34x7* | I |
| Erie, E | 1½ | .... | 3¾x5¼ | 36x6† | 36x6† | W |
| Erie, A | 2½ | .... | 4¼x5½ | 36x4 | 36x4d | W |
| F.W.D., B | 3 | 4200 | 4¾x5½ | 36x6 | 36x6 | B |
| Facto, 1921 | 2½ | 2295§ | 4¼x5½ | 36x4* | 36x8* | W |
| Fageol, 1½ | 1½ | 3000 | 3¾x5¼ | 34x3½* | 34x6* | W |
| Fageol, 2½ | 2½ | 3900 | 4¼x5¾ | 34x4 | 36x7 | W |
| Fageol, 3½ | 3½ | 5000 | 4½x6¼ | 36x5* | 40x5d* | W |
| Fageol, 5 | 5 | 5700 | 4½x6¼ | 36x6 | 40x6d | W |
| Farge, R | 2 | 1900 | 3¾x5 | 36x4 | 36x6 | I |
| Federal, SD | 1½ | 1800 | 3¾x5 | 35x5† | 36x6† | W |
| Federal, TE | 1½ | 2175 | 4½x5¼ | 36x3½ | 36x5 | W |
| Federal, UE | 2 | 2425 | 4½x5¼ | 36x4 | 36x7 | W |
| Federal, WE | 3½ | 3150 | 4½x5½ | 36x5 | 36x5d | W |
| Federal, X2 | 5-6 | 4500 | 4¾x6 | 36x6 | 40x6d | W |
| Ford, TT | 1 | 430 | 3¾x4 | 30x3½* | 32x4½* | W |
| Forschler, A | 1 | .... | 3½x5 | 34x3 | 34x4 | W |
| Forschler, AX | 1½ | .... | 3½x5 | 36x3½ | 36x5 | W |
| Forschler, B | 2 | .... | 4½x5¼ | 36x4 | 36x7 | W |
| Forschler, BX | 3 | .... | 4½x5¼ | 36x4 | 36x8 | W |
| Front Drive C | 1½ | 2800 | 3⅝x5½ | 5 | 4 | W |
| G & J** 20 | 1 | 2275 | 3⅝x5⅛ | 34x5† | 34x5† | W |
| G & J** A | 2-2½ | 3375 | 4x5¼ | 36x4 | 36x7 | W |
| G & J** B | 3½-4 | 4475 | 4½x5½ | 36x5 | 36x5d | W |
| G.M.C., K16 | 1 | 1495 | 3½x5½ | 34x5† | 34x5† | B |
| G.M.C., K41 A | 2 | 2775 | 4 x5½ | 36x4* | 36x7* | W |
| G.M.C., K71 A | 3½ | 3950 | 4½x6 | 36x5 | 40x5d | W |
| G.M.C., K101A | 5 | 4350 | 4½x6 | 36x5 | 40x6d | W |
| G.W.W. | 1½ | 1950 | 3¾x5½ | 35x5 | 35x5 | I |
| Garford, 15 | ¾ | $1590 | 3⅝x5⅛ | 34x5† | 34x5† | W |
| Garford, 25 | 1¼ | 1990 | 3¾x5⅛ | 36x3½ | 36x4 | W |
| Garford, 70-H | 2 | 2750 | 4¼x5½ | 36x4 | 36x7 | W |
| Garford, 77D | 3½ | 3750 | 4½x6 | 36x5 | 36x6d | W |
| Garford, 68D | 5 | 4500 | 5 x6½ | 36x6 | 40x6d | W |
| Garford, 150-A | 7½ | 5200 | 5x6½ | 36x6 | 40x7d | C |
| Gary, F | 1 | 2100 | 3¾x5 | 36x3½ | 36x4 | W |
| Gary, I | 1½ | 2550 | 4 x5½ | 36x3½ | 36x5 | W |
| Gary, J | 2½ | 3150 | 4¼x5½ | 36x4 | 36x7 | W |
| Gary, K | 3½ | 4050 | 4½x6 | 36x5 | 40x5d | W |
| Gary, M | 5 | 5150 | 5 x6½ | 36x6 | 40x6d | W |
| Gersix, M | 1½ | 3100 | 4 x5½ | 36x3½ | 36x7 | W |
| Gersix, K | 2½ | 3500 | 4½x5½ | 36x4 | 36x8 | W |
| Gersix | 3½ | 4500 | 4½x6 | 36x5 | 40x12 | W |
| Golden West, GH | 3 | 4500 | 4½x6 | 36x7 | 36x7 | W |
| Golden West, G | 3½ | 5090 | 4½x5½ | 36x6 | 36x6 | W |
| Graham Bros. 1-Ton | 1 | 1265 | 3⅞x4½ | 33x4½ | 34x5† | B |
| Graham Bros. 1½-Ton | 1½ | 1325 | 3⅞x4½ | 33x4½† | 36x6† | B |
| [1]Gramm-Pion. 10 | 1 | 1365§ | 3½x5 | 33x5† | 33x5† | F |
| [1]Gramm-Pion. 15 | 1½ | 1900§ | 3¾x5 | 36x3½* | 36x5* | I |
| [1]Gramm-Pion. 65 | 1½ | 2500§ | 3¾x5 | 36x3½* | 36x5 | W |
| [1]Gramm-Pion. 20 | 2 | 2925§ | 4¼x5¼ | 36x4* | 36x7* | W |
| [1]Gramm-Pion. 30 | 3 | 3275§ | 4¼x5½ | 36x4* | 36x4d* | W |
| [1]Gramm-Pion. 40 | 4 | 3995§ | 4½x5½ | 36x5 | 36x5d* | W |
| [1]Gramm-Pion.75-P | 3½ | 4225§ | 4½x5½ | 36x6† | 42x9† | W |
| [1]Gramm-Pion. 50 | 5-6 | 4895§ | 4¾x6 | 36x6 | 40x6d* | W |
| Hahn, J4 | 1 | .... | 3¾x5 | 34x5* | 34x5* | W |
| Hahn, CD | 1½ | .... | 4¼x5¼ | 36x3½* | 36x6* | W |
| Hahn, EE | 2½ | .... | 4½x5½ | 36x4* | 36x8* | W |
| Hahn, F | 3½ | .... | 4½x5½ | 36x5* | 36x10* | W |
| Hahn, EF | 5 | .... | 4¾x6 | 36x6 | 40x12 | W |
| Hal-Fur, E | 1½ | 2350 | 4 x5¼ | 34x5† | 38x7† | W |
| Hal-Fur, B | 2½ | 3000 | 4¼x5½ | 35x5* | 38x7* | W |
| Hal-Fur, F | 3½ | 4000 | 4½x5½ | 36x6† | 40x10† | W |
| Hall, 1½ | 1½ | 3100 | 3¾x5 | 34x5† | 38x7† | W |
| Hall, 2½ | 2½ | 3275 | 4¼x5¼ | 36x4 | 36x6 | W |
| Hall, 3½ | 3½ | 4100 | 4½x5½ | 36x5 | 36x5d | W |
| Hall, 5 | 5 | 5100 | 4½x5½ | 36x5 | 40x6d | W |
| Hall, 7 chain | 7 | 5100 | 4½x5½ | 36x5 | 40x6d | C |
| Harvey, WOA | 2 | 2650 | 4½x5½ | 34x4 | 34x7 | W |
| Harvey, WFA | 2½ | 2950 | 4¼x5½ | 36x4 | 36x7 | W |
| Harvey, WHA | 3½ | 3950 | 4½x6¼ | 36x5 | 36x5d | W |
| Hawkeye, K | 1½ | 1850 | 3¾x5½ | 34x3½* | 34x5* | I |
| Hawkeye, M | 2 | 2650 | 4¼x5 | 36x4* | 36x6* | I |
| Hawkeye, N | 3½ | 3700 | 4½x6¾ | 36x5* | 36x10* | I |
| Hendrickson, N | 2½ | 3150 | 4¼x5¾ | 36x4* | 36x7* | W |
| Hendrickson, M | 3½ | 3975 | 4½x5 | 36x5* | 36x5d* | W |
| Huffman, B | 1½ | 1995 | 3¾x5 | 34x3½ | 34x6 | W |
| Huffman, C | 1½ | 1795 | 3¾x5½ | 34x3½ | 34x6 | I |
| Hurlburt A | 1½ | 2850 | 4 x5½ | 34x4 | 34x5 | W |
| Hurlburt B | 2½ | 3750 | 4¼x5½ | 36x4 | 36x4d | W |
| Hurlburt C | 3½ | 4590 | 4½x6 | 36x5 | 36x5d | W |
| Hurlburt D | 5 | 5500 | 4½x6 | 36x5 | 40x6d | W |
| Indep'd't(Iowa), B | 1 | 1665 | 3½x5 | 34x3½ | 34x4 | I |
| Indep'd't(Iowa), G | 1½ | 2040 | 3¾x5¼ | 34x3½ | 34x5 | I |
| Indep'd't(Ia.), H.I | 2½ | 2940 | 4¼x5¼ | 36x4 | 36x4 | I |
| Indep d't(Ohio), F | 1½ | 2385 | 3¾x5 | 36x3½ | 36x5 | W |
| Indep'd't(Ohio), H | 2½ | 3085 | 4¼x5¼ | 36x4 | 36x4d | W |
| Indep'd't(Ohio), K | 3½ | 3985 | 4½x5½ | 36x5 | 36x5d | W |
| Indiana, 12 | 1½ | .... | 3¾x5¼ | 34x3½* | 34x5* | W |
| Indiana, 20 | 2 | .... | 4¼x5½ | 36x4* | 36x7* | W |
| Indiana, 25 | 2½ | .... | 4¼x5½ | 36x4* | 36x8* | W |
| Indiana, 35 | 3½ | .... | 4½x5½ | 36x5* | 36x5d* | W |
| Indiana, 51 | 5 | .... | 5 x6¼ | 36x5* | 40x6d* | W |
| Inland, D | 2 | 2950 | 4 x5 | 34x5 | 34x6 | I |
| International, S | ¾ | 1500 | 3½x5 | 34x5† | 34x5† | I |
| International, 21 | 1 | 1750 | 3½x5¼ | 36x3½ | 36x3½ | I |
| International, 31 | 1½ | 1850 | 3½x5¼ | 36x3½ | 36x4 | I |
| International, 41 | 2 | 2100 | 3½x5¼ | 36x3½ | 36x5 | I |
| International, 61 | 3 | 2400 | 4¼x5 | 36x4 | 36x6 | I |
| International, 101 | 5 | 3600 | 4¼x5 | 36x5 | 40x10 | I |
| J & J, D | 2 | 3250 | 4 x5 | 34x4* | 34x6 | I |
| Jackson, 4WD | 3½ | 3850 | 4½x5½ | 36x7 | 36x7 | B |
| Jumbo, 15 | 1½ | 2425 | 3¾x5¼ | 36x3½ | 36x5 | I |
| Jumbo, 20 | 2 | 2675 | 3¾x5¼ | 35x5† | 38x7† | I |
| Jumbo, 25 | 2½ | 3090 | 4¼x5½ | 36x4 | 36x7 | I |
| Jumbo, 30 | 3 | 3590 | 4¼x5½ | 36x6† | 42x9† | I |
| Jumbo, 35 | 3½ | 4090 | 4½x6 | 36x5 | 36x10† | I |
| Jumbo, 40 | 4 | 4730 | 4½x6 | 38x7† | 44x10 | I |
| K-Z, 1 | 1 | 1750 | 3½x5 | 34x3½ | 34x5 | W |
| K-Z, 1½ | 1½ | 2075 | 3¾x5 | 36x4 | 36x6 | W |
| K-Z, 2½ | 2½ | 2550 | 4¼x5¼ | 36x4 | 36x8 | W |
| K-Z, 3½ | 3½ | 3350 | 4½x5½ | 36x5 | 40x10 | W |
| K-Z, 5 | 5 | 3850 | 4½x5½ | 36x6 | 40x6d | W |
| Kalamazoo, G-1 | 1½ | 2495 | 3¾x5 | 34x4 | 34x5 | W |
| Kalamazoo, G-2 | 1½ | 2800§ | 3¾x5 | 36x4 | 36x6 | W |
| Kalamazoo, H | 2½ | 3275§ | 4 x6 | 36x4 | 36x8 | W |
| Kalamazoo, K | 3½ | 4000§ | 4¼x6 | 36x5 | 36x10 | W |
| Kalamazoo K-5 | 5 | 4500§ | 4½x6 | 36x6 | 36x6d | W |
| Karavan, A | 2½ | 3900 | 4¼x6 | 36x4 | 36x8 | W |
| Kearns, H | 1 | 1600 | 3½x5 | 32x4½† | 32x4½† | I |
| Kearns, N | 2 | 2200 | 3½x5 | 34x3½ | 34x6 | I |
| [2]Kelly-S., K-31 | 1½ | 2700 | 3¾x5¼ | 36x3½ | 36x6 | C |
| [2]Kelly-S., K-34 | 1½ | 2700 | 3¾x5¼ | 36x3½ | 36x6 | W |
| [2]Kelly-S., K-38 | 2½ | 2900 | 3¾x5¼ | 36x4 | 36x4d | W |
| [2]Kelly-S., K-35 | 2½ | 2900 | 3¾x5¼ | 36x4 | 36x4d | C |
| [2]Kelly-S., K-40 | 3½ | 2900 | 4½x6½ | 36x5 | 40x5d | C |
| [2]Kelly-S., K-41 | 3½ | 3900 | 4½x6½ | 36x5 | 40x5d | I |
| [2]Kelly-S., K-42 | 3½ | 3900 | 4½x6½ | 36x5 | 40x5d | W |

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

1—Gramm-Pioneer. 2—Kelly-Springfield.

# Specifications of Current Motor Truck Models—Continued

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES Front | TIRES Rear | Final Drive |
|---|---|---|---|---|---|---|
| [2]Kelly-S., K-50 | 5 | .... | 4½x6½ | 36x6 | 40x6d | C |
| [2]Kelly-S., K-60 | 6 | .... | 4½x6½ | 36x6 | 40x7d | C |
| Keystone, 40 | 2 | $2450 | 3⅝x5⅛ | 34x5† | 38x7† | I |
| Kimball, AB | 2 | 3675 | 4 x6 | 36x4 | 36x7 | W |
| Kimball, AC | 2½ | 3975 | 4¼x6 | 36x4 | 36x8 | W |
| Kimball, AK | 3 | 4500 | 4½x6 | 36x4 | 36x10 | W |
| Kimball, AE | 4 | 5000 | 4⅝x6 | 36x5 | 40x12 | W |
| Kimball, AF | 5 | 5800 | 5 x6 | 36x6 | 40x7d | W |
| Kissel, Express | 1 | 1985† | 3⅞x5½ | 34x5† | 34x5† | W |
| Kissel, Utility | 1½ | 1975 | 3⅞x5½ | 36x3½ | 36x5 | W |
| Kissel, Freighter | 2½ | 2875 | 4¼x5½ | 36x4 | 36x7 | W |
| Kissel, H. D. | 4 | 3675 | 4¼x5½ | 36x5 | 36x5d | W |
| Kleiber, AA | 1 | 2600 | 4⅛x5¼ | 34x3½* | 34x5* | W |
| Kleiber, A | 1½ | 3100 | 4⅛x5¼ | 36x3½* | 36x6* | W |
| Kleiber, BB | 2 | 3600 | 4⅛x5¼ | 36x4* | 36x7* | W |
| Kleiber, B | 2½ | 3950 | 4½x5½ | 36x5* | 36x8 | W |
| Kleiber, C | 3½ | 4600 | 4½x5½ | 36x5 | 36x5d | W |
| Kleiber, D | 5 | 5300 | 5 x6½ | 36x6 | 40x12 | W |
| Koehler, D | 1½ | 1995 | 3½x5½ | 34x3½ | 34x5 | W |
| Koehler, M | 2½ | 3175 | 4 x5⅛ | 36x4 | 36x7 | W |
| Koehler, MCS | 2½ | 3275 | 4 x5⅛ | 36x4 | 36x7 | W |
| Koehler, F | 3½ | 4150 | 4½x5½ | 36x5 | 36x10 | W |
| Koehler,MT, Trac | 5 | 3275 | 4 x5⅛ | 36x4 | 36x7 | W |
| Lange, B | 2½ | 3350 | 4⅛x5¼ | 36x4* | 36x7* | C |
| Larrabee, X-Z | 1 | 1925 | 3¼x4½ | 34x5† | 34x5† | B |
| Larrabee, U | 1½ | 2400 | 3¾x5 | 34x3½ | 34x5 | W |
| Larrabee, K | 2½ | 3200 | 4⅛x5¼ | 36x4 | 36x7 | W |
| Larrabee, L-4 | 3½ | 4000 | 4½x5½ | 36x5 | 36x5d | W |
| Larrabee, W | 5 | 4800 | 4¾x6 | 36x6 | 40x6d | W |
| Luedinghaus, C | 1 | 1695 | 3½x5 | 35x5† | 35x5† | W |
| Luedinghaus, W | 1½ | 2490 | 3¾x5¼ | 34x3½* | 34x5* | W |
| Luedinghaus, K | 2–2½ | 3150 | 4¼x5¾ | 36x4* | 36x7* | W |
| Maccar, L | 1½ | 2700 | 4⅛x5¼ | 36x4 | 36x6 | W |
| Maccar, H-A | 2 | 3100 | 4⅛x5¼ | 36x4 | 36x4d | W |
| Maccar, H-2 | 3 | 3400 | 4½x5½ | 36x4 | 36x5d | W |
| Maccar, H-3 | 4 | 4200 | 4½x5½ | 36x5 | 36x6d | W |
| Maccar, G | 5-6 | 4950 | 4¾x6 | 36x5 | 40x6d | W |
| MacDonald, A | 7½ | 5750 | 4½x6 | 40x7 | 40x14 | I |
| Mack, AB D.R. | 1½ | 3150 | 4 x5 | 36x4 | 36x3½d | D |
| Mack, AB Chain | 1½ | 3000 | 4 x5 | 36x4 | 36x3½d | C |
| Mack, AB Chain | 2 | 3300 | 4 x5 | 36x4 | 36x4d | C |
| Mack, AB D.R. | 2 | 3750 | 4 x5 | 36x4 | 36x4d | D |
| Mack, ABDR | 2½ | 3850 | 4 x5 | 36x4 | 36x4d | D |
| Mack, AB | 2½ | 3400 | 4 x5 | 36x4 | 36x4d | C |
| Mack, AC Chain | 3½ | 4950 | 5 x6 | 36x5 | 40x5d | C |
| Mack, AC Chain | 5 | 5500 | 5 x6 | 36x6 | 40x6d | C |
| Mcck, AC Chain | 6½ | 5750 | 5 x6 | 36x6 | 40x12 | C |
| Mack, AC Chain | 7½ | 6000 | 5 x6 | 36x7 | 40x7d | C |
| Mack Trac, AB | 5 | 3400 | 4 x5 | 36x4 | 36x4d | C |
| Mack Trac., AC | 7 | 4950 | 5 x6 | 36x5 | 40x5d | C |
| Mack Trac. AC | 10 | 5500 | 5 x6 | 36x6 | 40x6d | C |
| Mack Trac., AC | 13 | 5750 | 5 x6 | 36x6 | 40x12 | C |
| Mack Trac., AC | 15 | 6000 | 5 x6 | 36x7 | 40x7d | C |
| Mapleleaf, AA** | 2 | 3775 | 4 x5¼ | 36x4 | 36x7 | W |
| Mapleleaf, BB** | 3 | 4350 | 4¼x5½ | 36x4 | 36x4d | W |
| Mapleleaf, CC** | 4 | 5100 | 4½x5½ | 36x5 | 36x5d | W |
| Mapleleaf, DD** | 5 | 6200 | 4½x5½ | 36x6 | 40x6d | W |
| Master, JW | 1½ | 2290 | 4½x5½ | 34x3½ | 34x5 | W |
| Master, W | 2½ | 2890 | 4¼x5½ | 34x4 | 36x7 | W |
| Master, D | 2½ | 3190 | 4¼x5½ | 34x4 | 36x7 | D |
| Master, A | 3½ | 3990 | 4½x6 | 36x5 | 40x5d | W |
| Master, E | 3½ | 4290 | 4½x6 | 36x5 | 40x5d | D |
| Master, B | 5 | 4990 | 4¾x6½ | 36x6 | 40x6d | W |
| Master, F | 5 | 5090 | 4¾x6½ | 36x6 | 40x6d | D |
| Master Trac., T | 6 | 3390 | 4¼x5½ | 34x4 | 36x7 | D |
| Maxwell, 1½ | 1½ | 932 | 3⅝x4½ | 32x3 | 32x4 | W |
| Menominee, HT | 1 | 2000 | 3¾x5 | 34x3½ | 36x5 | W |
| Menominee, H | 1½ | 2475 | 4 x5 | 36x3½ | 36x5 | W |
| Menominee, D | 2 | 2875 | 4 x6 | 36x4 | 36x8 | W |
| Menominee, G | 3½ | 3800 | 4½x6 | 36x5 | 36x10 | W |
| Menominee, J-3 | 5 | 4850 | 4¾x6 | 36x6 | 40x12 | W |
| Moline, 10 | 1½ | 1985 | 3½x5 | 34x5† | 36x6† | I |
| Moreland, 21B | 1½ | 2800 | 4⅛x5¼ | 36x3½ | 36x6 | W |
| Moreland, 21C | 2½ | 3500 | 4½x5½ | 36x4 | 36x8 | W |
| Moreland, 21H | 3½ | 4600 | 4¾x6 | 36x5 | 40x5d | W |
| Moreland, 21J | 5 | 5000 | 4¾x6 | 36x6 | 40x6d | W |
| Napoleon, 7 | ¾ | 1350 | 3½x5 | 38x4 | 33x4† | I |
| Napoleon, 9 | 1 | 1535 | 3½x5 | 35x5* | 35x5† | I |
| Napoleon, 11 | 1½ | 1860 | 3½x5 | 35x5* | 36x6* | I |
| Nash, 2018 | 1 | 1895 | 3¾x5¼ | 35x5 | 36x6 | I |
| Nash, 3018 | 2 | 2550 | 3¾x5¼ | 36x6 | 40x8 | I |
| Nash, Quad. | 2 | 3250 | 4¼x5½ | 40x8 | 40x8 | I |
| Nash, 5018 | 2½ | 2550 | 3¾x5¼ | 34x4 | 34x6 | I |
| [3]Nelson, F1½ | 1½ | .... | 4⅛x5¼ | 36x3½ | 36x5 | W |
| [3]Nelson, F2 | 2 | .... | 4⅛x5¼ | 36x4 | 36x7 | W |
| [3]Nelson, F3½ | 3½ | .... | 4½x5½ | 36x5 | 36x5d | W |
| [3]Nelson, FC5 | 5 | .... | 4¾x6 | 36x6 | 40x6d | W |
| Netco, D | 2 | 3100 | 4¼x5¼ | 36x4* | 36x7* | W |
| Netco, H | 2½ | 3500 | 4½x5½ | 36x4* | 36x8* | W |
| New York, M | 1½ | .... | 4⅛x5¼ | 36x3½ | 36x5 | W |
| New York, N | 2–2½ | .... | 4⅛x5¼ | 36x4 | 36x4d | W |
| Niles, E | 2 | 3000 | 4¼x5¼ | 36x4* | 36x7* | W |
| Noble, B30 | 1½ | 2100 | 3¾x5¼ | 36x3½ | 36x5 | W |
| Noble, C40 | 2 | 2675 | 4 x5½ | 36x4 | 36x7 | W |
| Noble, D50 | 2½ | 2950 | 4¼x5½ | 36x4 | 36x8 | W |
| Noble, E70 | 3½ | 3800 | 4½x6 | 36x5 | 36x10 | W |
| Northway, B-2 | 2 | 3400 | 4 x6 | 36x4 | 36x4d | W |
| Northway, B-3 | 3½ | 4400 | 4 x6 | 36x5 | 40x5d | W |
| NorthwesternW | 1½ | 2700 | 4⅛x5¼ | 34x4 | 36x6 | W |
| Northwestern WS | 2½ | 3500 | 4½x5½ | 36x4 | 36x8 | W |
| Norwalk, 25E | 1 | 1595 | 3½x5 | 34x3½ | 34x4 | W |
| Norwalk, 35E | 1½ | 1925 | 3½x5 | 34x3½ | 34x3½d | W |
| Norwalk,35E.Spec | 1½ | 2285 | 3¾x5¼ | 34x3½ | 34x5 | W |
| O. K., K1 | 1½ | $2675 | 4 x5½ | 36x3½ | 36x5 | W |
| O. K., L1 | 2½ | 3450 | 4¼x5½ | 36x4 | 36x8 | W |
| O. K., M1 | 3½ | 4250 | 4½x6 | 36x5 | 36x5d | W |

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES Front | TIRES Rear | Final Drive |
|---|---|---|---|---|---|---|
| Ogden, D | ½ | .... | 3¾x5 | 36x3½ | 36x5 | W |
| Ogden, D | 1½ | .... | 3¾x5 | 36x3½ | 36x5 | W |
| Ogden, E | 2½ | .... | 4½x5¼ | 36x4 | 36x8 | W |
| Old Hickory, W | 1 | 1775 | 3¾x5 | 36x3½* | 36x4* | W |
| Old Reliable, A | 1½ | 2350 | 4 x5 | 34x4 | 36x6 | W |
| Old Reliable, B | 2½ | 3500 | 4¼x6 | 34x4 | 36x4d | W |
| Old Reliable, C | 3½ | 4250 | 4¼x6 | 36x5 | 36x5d | W |
| Old Reliable, D | 5 | 5250 | 4¾x6 | 36x6 | 40x6d | W |
| OldReliable,KLM | 7 | 6000 | 4¾x6¼ | 36x6 | 40x7d | C |
| Oldsmobile Econ. | 1 | 1095 | 3¼x5¼ | 35x5† | 35x5† | I |
| Olympic, A | 2½ | 3200 | 4¼x5½ | 36x4 | 36x8 | W |
| Oshkosh, A | 2 | 3750 | 3½x5 | 36x6† | 36x6† | 4 |
| Oshkosh, AA | 2 | 3850 | 3½x5 | 36x6† | 36x6† | 4 |
| Oshkosh, B | 2½ | 4150 | 4 x5⅛ | 38x7† | 38x7† | 4 |
| Oshkosh, BB | 2½ | 4300 | 4 x5⅛ | 38x7† | 38x7† | 4 |
| Packard, EC | 1½–3 | 3100 | 4½x5½ | 36x4 | 36x7 | W |
| Packard, EX | 1½–3 | 3100 | 4½x5½ | 36x6† | 40x8† | W |
| Packard, ED | 2–4½ | 4100 | 4½x5½ | 36x5 | 36x5d | W |
| Packard, EF | 4–7½ | 4500 | 5 x5½ | 36x6 | 40x6d | W |
| Paige, 52-19 | 1½ | 1950 | 4 x5¼ | 34x3½ | 34x5 | W |
| Paige, 54-20 | 2½ | 2420 | 4¼x5½ | 34x4 | 34x8 | W |
| Paige, 51-18 | 3½ | 3145 | 4½x5½ | 36x5 | 36x5d | W |
| Parker, F20 | 2 | 3500 | 4 x6 | 34x4 | 36x4d | W |
| Parker, J20 | 3½ | 4400 | 4½x6 | 36x5 | 40x5d | W |
| Parker, M20 | 5 | 5500 | 4¾x6 | 36x6 | 40x6d | W |
| Patriot, Revere | 1 | 1500 | 3¾x5 | 35x5† | 35x5† | W |
| Patriot, Lincoln | 2 | 2050 | 4 5¼ | 34x3½ | 34x5 | W |
| Patriot, Washgt'n | 3 | 2900 | 4½x5½ | 36x4 | 36x7 | W |
| Piedmont, 4-30 | 1 | 1200 | 3½x5 | 34x4† | 34x4† | W |
| Pierce-Arrow | 2 | 3200 | 4 x5½ | 36x4 | 36x4d | W |
| Pierce-Arrow | 3½ | 4350 | 4½x6¾ | 36x5 | 36x5d | W |
| Pierce-Arrow | 5 | 4850 | 4½x6¾ | 36x5 | 40x6d | W |
| Pioneer, 59 | 1 | 1550 | 3¾x4¼ | 32x4½† | 32x4½† | W |
| Pittsburgher | 1½–2 | 3000 | 3⅝x5 | 36x4 | 36x6 | |
| Pittsburgher | 3 | 3800 | 4⅛x5¼ | 36x5* | 36x8 | W |
| Power, F | 2 | 3150 | 3¾x5¼ | 36x5 | 36x7 | W |
| Power, C | 3½ | 4250 | 4¼x5½ | 36x5 | 40x10 | W |
| Premocar, B-143 | 1½ | 2475 | 3½x5 | 36x6† | 36x6† | W |
| Rainier, R-21 | ¾ | 1990 | 3½x5 | 35x5† | 35x5† | W |
| Rainier, R-19 | 1 | 2150 | 3½x5 | 34x3½ | 31x4 | W |
| Rainier, R-16 | 1½ | 2490 | 3¾x5 | 34x3½ | 34x5 | W |
| Rainier, R-18 | 2 | 2890 | 4½x5¼ | 34x4 | 34x6 | W |
| Rainier, R-20 | 2½ | 3550 | 4½x5¼ | 34x4 | 34x7 | W |
| Rainier, R-15 | 3½ | 4400 | 4½x5½ | 36x5 | 36x5d | W |
| Rainier, R-17 | 5 | 5100 | 4½x6 | 36x6 | 36x6d | W |
| Ranger, TK-22-2 | 2 | 2775 | 3¾x5 | 36x6† | 38x7† | W |
| Reo, F | ¾–1¼ | 1245 | 4⅛x4½ | 34x4½† | 34x4½† | B |
| Reliance, 10A | 1½ | 2400 | 4 x5½ | 36x3½ | 36x5 | I |
| Reliance, 20B | 2½ | 3100 | 4¼x5½ | 36x4 | 36x4d | I |
| Republic, 75 | ¾ | 1395†† | 3½x5 | 32x4½† | 32x4½† | I |
| Republic, 10 | 1 | 1395 | 3¾x5 | 34x3 | 34x4 | I |
| Republic,10Exp. | 1 | 1695 | 3¾x5 | 35x5† | 34x5† | I |
| Republic, 11X | 1½ | 1795 | 3¾x5 | 34x3½ | 34x6 | I |
| Republic, 19 | 2½ | 2195 | 4⅛x5¼ | 36x4 | 36x7 | I |
| Republic, 20 | 3½ | 3095 | 4½x5½ | 36x5 | 36x10 | I |
| Rowe, CW | 1½ | 3000 | 3¾x5 | 36x6† | 36x6† | W |
| Rowe, C. D. W. | 2 | 3300 | 4 x5 | 34x4 | 36x3½d | W |
| Rowe, G. S. W. | 3 | 4150 | 4 x6 | 34x5 | 36x5d | W |
| Rowe, G. P. W. | 3 | 5250 | 3¼x5‡ | 38x7† | 42x9† | W |
| Rowe, HW | 4 | 4500 | 4¼x6 | 36x5 | 36x6d | W |
| Rowe, F. W. | 5 | 5500 | 4½x6 | 36x6 | 40x6d | W |
| Sandow, G | 1 | 2295 | 3¾x5 | 34x3½ | 34x5 | W |
| Sandow, CG | 1½ | 2590 | 3¾x5 | 34x4 | 34x6 | W |
| Sandow, J | 2½ | 3275 | 4½x5¼ | 36x4 | 36x7 | W |
| Sandow, M | 3½ | 4295 | 4½x5½ | 36x5 | 36x5d | W |
| Sandow, L | 5 | 4975 | 4½x5½ | 36x6 | 40x6d | W |
| Sanford, 25 | 2½ | .... | 4½x5¼ | 36x4 | 36x4d | W |
| Sanford, 35 | 3½ | .... | 4½x5½ | 36x5 | 36x5d | W |
| Sanford, 50 | 5 | .... | 4¾x6 | 36x5 | 40x6d | W |
| Schacht, 2-Ton | 2 | 3200 | 4¼x5½ | 36x4 | 36x7 | W |
| Schacht, 3-Ton | 3 | 3800 | 4¼x5½ | 36x5 | 36x5d | W |
| Schacht, 4-Ton | 4 | 4200 | 4½x6 | 36x5 | 40x5d | W |
| Schacht, 5-Ton | 5 | 4400 | 4½x6 | 36x5 | 40x6d | W |
| Schacht, 7-Ton | 7 | 5000 | 4½x6 | 36x6 | 40x7d | W |
| Schwartz, A | 1 | 16.5 | 3½x5 | 33x4½† | 33x4½† | B |
| Schwartz, BW | 1½ | 2690 | 3¾x5½ | 34x3½* | 34x7* | W |
| Schwartz, C.W.S. | 2½ | 3200 | 4¼x5½ | 36x4 | 36x8 | W |
| Schwartz, DW | 5 | 4900 | 4½x6 | 36x6 | 40x12 | W |
| Selden, 30 | 1½ | 2250 | 3¾x5 | 34x3½ | 34x5 | W |
| Selden, 31 | 1½–2½ | 3350 | 4½x5¼ | 34x5 | 38x7 | W |
| Selden, 50 | 2½ | 3250 | 4½x5¼ | 36x4 | 36x7 | W |
| Selden, 51 | 2½–3½ | 4350 | 4½x5½ | 36x6† | 40x8† | W |
| Selden, 70 | 3½–5 | 3750 | 4½x5½ | 36x5 | 36x10 | W |
| Selden, 90 | 5–7 | 4950 | 4¾x6 | 36x6 | 40x12 | W |
| Seneca, M | ½ | 920 | 3½x4½ | 30x3½† | 30x3½† | B |
| Service, 12 | ¾ | .... | 3¼x4½ | 32x4½† | 32x4½† | B |
| Service, 15 | 1¼ | .... | 3⅝x5 | 34x4½† | 35x5† | B |
| Service, 220 | 1½ | .... | 3½x5½ | 34x3½ | 34x5 | W |
| Service, 31 | 2 | .... | 4 x5½ | 36x3½ | 36x6 | W |
| Service, 36 | 2 | .... | 4¼x5½ | 35x5† | 38x7† | W |
| Service, 51 | 2½ | .... | 4¼x5½ | 36x4 | 36x7 | W |
| Service, 71 | 3½ | .... | 4½x5½ | 36x5 | 36x5d | W |
| Service, 76 | 3½ | .... | 4½x6 | 36x5 | 36x5d | W |
| Service, 101 | 5 | .... | 4½x6 | 36x6 | 40x6d | W |
| Signal, NF | 1 | 1950 | 4⅜x5 | 34x5† | 36x6† | W |
| Signal, H | 1½ | 2450 | 4¼x5¼ | 34x4 | 36x6 | W |
| Signal, J | 2½ | 2875 | 4½x5¼ | 34x4 | 36x8 | W |
| Signal, M | 3½ | 3675 | 4½x5½ | 36x5 | 40x5d | W |

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES Front | TIRES Rear | Final Drive |
|---|---|---|---|---|---|---|
| Signal, R | 5 | $4400 | 4¾x6 | 36x6 | 40x6d | W |
| Southern, 10 | 1 | 2090 | 3⅜x5 | 34x3½ | 34x4 | W |
| Southern, 15 | 1½ | 2590 | 3¾x5⅛ | 36x6† | 34x4 | W |
| Southern, 20 | 2 | 2990 | 4¾x5¼ | 36x6† | 40x8* | W |
| Standard, 1-K | 1½ | 1600 | 3¾x5 | 34x3½* | 34x5* | W |
| Standard, 76 | 2½–3 | 2400 | 4½x5¼ | 36x4* | 36x7* | W |
| Standard, 66 | 3½–5 | 3150 | 4½x5½ | 36x5 | 36x10 | W |
| Standard, 5-K | 5–7 | 4400 | 4¾x6 | 36x6 | 40x12 | W |
| Sterling, 1½ | 1½ | 2885 | 4 x5¾ | 36x3½ | 36x5* | W |
| Sterling, 2 | 2 | 3085 | 4 x5¾ | 36x4 | 36x6* | W |
| Sterling, 2½ | 2½ | 3290 | 4¾x5¾ | 36x4* | 36x4d* | W |
| Sterling, 3½ | 3½ | 4325 | 4½x6¼ | 36x5* | 40x5d* | W |
| Sterling, 5-W | 5 | 4950 | 5 x6¼ | 36x6* | 40x6d* | W |
| Sterling, 5-C | 5 | 5500 | 5 x6¼ | 36x6 | 40x6d | C |
| Sterling, 7½ | 7½ | 6000 | 5 x6¼ | 36x6 | 40x7d | C |
| Stewart, 14 | ¾ | 1195 | 3⅝x5⅛ | 32x4½† | 32x4½† | I |
| Stewart, 15 | 1 | 1395 | 3⅝x5⅛ | 35x5† | 35x5† | I |
| Stewart, 9 | 1½ | 1790 | 3¾x5 | 34x3½ | 34x5 | I |
| Stewart, 7 | 2 | 2090 | 4¼x5¼ | 34x4 | 34x7 | I |
| Stewart, 7-X | 2½ | 2290 | 4¼x5½ | 34x4 | 34x7 | I |
| Stewart, 10 | 3½ | 3090 | 4½x5½ | 36x5 | 36x5d | I |
| Stewart, 10-X | 3½ | 3850 | 4½x6 | 36x5 | 36x5d | I |
| Stoughton, C | ¾ | 1240 | 3½x5 | 34x4½† | 34x4½† | W |
| Stoughton, A | 1 | 1995 | 3¾x5¼ | 34x4½† | 35x5† | W |
| Stoughton, B | 1½ | 2350 | 3¾x5¼ | 36x3½ | 36x5 | W |
| Stoughton, D | 2 | 2800 | 4 x5⅛ | 36x4 | 36x7 | W |
| Stoughton, F | 3 | 3600 | 4¼x5½ | 36x5d | 36x5d | W |
| Sullivan, E | 2 | 2800 | 4¼x5½ | 36x4* | 36x7* | W |
| Sullivan, H | 3½ | 3750 | 4½x6 | 36x5 | 36x5d | W |
| Superior, D | 1 | 1650 | 3¾x5 | 34x4½† | 34x4 | I |
| Superior, E | 2 | 2600 | 4½x5¼ | 36x4 | 36x6 | I |
| Super Truck, 50 | 2½ | 3300 | 4 x6 | 36x4 | 36x8 | W |
| Super Truck, 70 | 3½ | 4300 | 4¼x6 | 36x5 | 40x5d | W |
| Super Truck, 100 | 5 | 5300 | 4¾x6 | 36x5 | 40x12 | W |
| Super Truck, 150 | 7½ | 6300 | 5 x6 | 36x6 | 40x7d | W |
| Texan, A38 | ¾ | 1095 | 3½x5 | 33x4 | 33x4 | I |
| Texan, TK39 | 1½ | 1550 | 3½x5 | 36x6 | 38x7 | W |
| Tiffin, GW | 1½ | 2100 | 4⅛x5¼ | 36x3½ | 36x5 | W |
| Tiffin, MW | 2½ | 2700 | 4⅛x5¼ | 36x4 | 36x3½d | W |
| Tiffin, PW | 3½ | 3600 | 4½x5½ | 36x5 | 40x5d | W |
| Tiffin, F50 | 5 | 4300 | 4¾x6 | 36x6 | 40x6d | W |
| Tiffin, F60 | 6 | 4500 | 4¾x6 | 36x6 | 40x12 | W |
| Titan | 2 | 2050 | 4x5½ | 34x4* | 36x7 | I |
| Titan | 3½ | 3950 | 4¼x5½ | 36x5 | 40x10 | I |
| Titan | 5 | 4550 | 4½x6 | 36x5 | 40x6d | I |
| Titan, 6-Ton | 6 | 5150 | 4½x6 | 36x5 | 40x12 | I |
| Tower, J | 1½ | 2900 | 4⅛x5¼ | 35x5 | 38x7 | W |
| Tower, H | 2½ | 3200 | 4½x5¼ | 36x4 | 36x7 | W |
| Tower, G | 3½ | 4100 | 4½x5½ | 36x5 | 36x5d | W |
| Traffic, C | ... | 1595 | 3¾x5 | 34x3½* | 34x5* | I |
| Traffic | 3 | 1895 | 3¾x5 | 36x4 | 36x7 | I |
| Transport, 20 | 1 | 1395 | 3¾x5½ | 34x3½ | 34x4 | I |
| Transport, 30 | 1½ | 1995 | 3¾x5 | 36x3½ | 36x5 | I |
| Transport, 50 | 2½ | 2785 | 4¼x5½ | 36x4 | 36x7 | I |
| Transport, 70 | 3½ | 3885 | 4½x6 | 36x5 | 36x10 | I |
| Traylor, B | 1½ | 2390 | 3¾x5⅛ | 34x3½ | 34x5 | W |
| Traylor, C | 2 | 2850 | 4 x5½ | 36x4 | 36x7 | W |
| Traylor, D | 3 | 3300 | 4¼x5½ | 36x4 | 36x8* | W |
| Traylor, E | 4 | 4450 | 4½x6 | 35x5 | 40x10 | W |
| Traylor, F | 5 | 4700 | 4½x6 | 36x6 | 40x6d | W |
| Triangle, AA | ¾–1 | 1385 | 3¼x5 | 34x4½† | 34x4½† | I |
| Triangle, A | 1½ | 2350 | 3¾x5¼ | 34x3½* | 34x6* | I |
| Triangle, C | 2 | 2700 | 3¾x5¼ | 36x4* | 36x6* | I |
| Triangle, B | 2½ | 2950 | 4 x5¾ | 36x4* | 36x7* | I |
| Triumph, G | 1 | 1995 | 3⅝x5⅛ | 34x5† | 34x5† | W |
| Triumph, HC | 1½ | 2550 | 3¾x5¼ | 36x3½ | 36x5 | W |
| Triumph, HB | 2 | 2900 | 3¾x5¼ | 36x4 | 36x7 | W |
| Twin City, B.W. | 2 | 2750 | 4 x5½ | 36x4 | 36x7 | I |
| Twin City, A.W. | 3½ | 3950 | 4¼x6 | 36x5 | 40x5d | W |
| [4]Twin City, B | 3½ | .... | 5½x6 | 36x6 | 36x6 | I |
| [4]Twin City, A | 5 | .... | 5½x6 | 36x7 | 36x7 | I |
| Ultimate, A | 2 | 3200 | 4 x5¼ | 36x3½ | 36x6 | W |
| Ultimate, AJ | 2 | 3250 | 4¼x5½ | 36x3½ | 36x6 | W |
| Ultimate, AJL | 2 | 3300 | 4¼x5½ | 36x3½ | 36x6 | W |
| Ultimate, B | 3 | 3750 | 4¼x5½ | 36x4 | 36x4d | W |
| Ultimate, BL | 3 | 3850 | 4¼x5½ | 36x4 | 36x4d | W |
| Ultimate, D | 5 | 5500 | 5 x6½ | 36x6 | 40x12 | W |
| Union, FW | 2½ | 3490 | 4 x6 | 36x5* | 36x8* | D |
| Union, HW | 4 | 4485 | 4½x6 | 36x6 | 40x12 | D |
| Union, JW | 6 | 5800 | 5 x6 | 36x6 | 40x14 | D |
| United, A | 1½ | 2445 | 3¾x5¼ | 36x3½* | 34x5* | I |
| United, B | 2½ | 3150 | 4¼x5½ | 36x4* | 36x7* | I |
| United, C | 3½ | 3975 | 4¼x5½ | 36x5 | 36x5d | I |
| United, V | 5 | 4500 | 4½x6 | 36x6 | 40x6d | I |
| United States, U | 1 | 1875 | 3⅝x5⅛ | 34x5† | 34x5† | B |
| United States,NW | 1½ | 2225 | 3¾x5 | 36x5 | 36x3½ | W |
| United States, N | 1½ | 1975 | 3¾x5 | 36x3½* | 36x5* | I |
| United States, R | 3 | 3075 | 4 x5¼ | 36x4 | 36x4d | W |
| United States, S | 4 | 3875 | 4½x5½ | 36x5 | 36x5d | W |
| United States, T | 6 | 4850 | 4¾x6½ | 36x6 | 40x6d | W |
| Velie, 46 | 1½ | 1585 | 3¾x5 | 36x3½ | 36x5 | I |
| Veteran, M** | 1½ | 2699 | 3¾x5¼ | 35x5† | 35x5† | W |
| Veteran, P** | 2 | 3699 | 4¼x5½ | 36x4 | 36x7 | W |
| Veteran, R** | 3 | 4200 | 4¼x5½ | 36x4 | 36x7 | W |
| Veteran, S** | 4 | 5395 | 4¼x6 | 36x5 | 36x10 | W |
| Vim, 29 | ½ | 1050 | 3½x4½ | 31x4† | 31x4† | W |
| Vim, 30 | ½ | 1175 | 3½x4½ | 32x4½ | 32x4½ | W |
| Vim, 31 | 1 | 1975 | 3¾x5⅛ | 35x5† | 35x5† | W |
| Vim, 22 | 2 | 3150 | 3¾x5⅛ | 36x4 | 36x6 | W |
| Vim, 23 | 3 | 3950 | 4¼x5½ | 36x5 | 36x5d | W |
| Vulcan, 25 | 2½ | 4000 | 4¼x6 | 36x4 | 36x8 | W |
| Vulcan, 25P | 3 | 4500 | 4¼x6 | 36x6 | 40x8 | W |
| Walker-JohnsonA | 2 | 2500 | 3¾x5 | 34x5 | 38x7 | W |
| Walker-Johnson,B | 3 | 3500 | 4¼x5½ | 36x4 | 36x8 | W |
| Walter, S | 5 | 4850 | 4½x6¼ | 36x6 | 40x6d | W |

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

**Final Drive:** W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

2—Kelly-Springfield. 3—Nelson Le Moon. 4—Twin City Four Wheel Drive.

# Specifications of Current Motor Truck Models—Continued

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES Front | TIRES Rear | Final Drive |
|---|---|---|---|---|---|---|
| Ward-LaF., 2B | 2½ | $2990 | 4⅜x5¾ | 36x4 | 36x4d | W |
| Ward-LaF., 4A | 3½ | 3990 | 4½x6¼ | 36x5 | 36x5d | W |
| Ward-LaF., 5A | 5 | 4590 | 5 x6¼ | 36x6 | 40x6d | W |
| Watson, B | 1 | 1685 | 3¾x5¼ | 35x5† | 35x5† | W |
| Watson, N | 3½ | 3825 | 4½x5½ | 36x5 | 36x10 | W |
| Western, W1½ | 1½ | 2550 | 4½x5¼ | 36x3½* | 36x5* | W |
| Western, L1½ | 1½ | 2550 | 3¾x5 | 36x3½* | 36x5* | W |
| Western, W2½ | 2½ | 3250 | 4½x5¼ | 36x4 | 36x7 | W |
| Western, L2½ | 2½ | 3250 | 4¼x6 | 36x4 | 36x7 | W |
| Western, W3½ | 3½ | 4250 | 4½x6 | 36x5 | 40x5d | W |
| White, 15 | ¾ | 2400 | 3¾x5½ | 34x5† | 34x5† | B |
| White, 20 | 2 | 3250 | 3¾x5½ | 36x4* | 36x7 | D |
| White, 40 | 3½ | 4200 | 3¾x5¾ | 36x5 | 40x5d | D |
| White, 45 | 5 | 4500 | 4¼x5¾ | 36x6 | 40x6d | D |
| White Hick., E | 1 | 1225 | 3¾x5 | 34x5† | 34x5† | W |
| White Hick., H | 1½ | 1375 | 3¾x5 | 36x3½ | 36x5 | W |
| White Hick., K | 2½ | 1675 | 4½x5¼ | 36x4 | 36x5 | W |
| Wichita, K | 1 | 2000 | 3¾x5¼ | 36x3* | 36x4* | W |
| Wichita, M | 2 | 2500 | 3¾x5¼ | 36x3½* | 36x6* | W |
| Wichita, RX | 3 | $3500 | 4¾x5¾ | 36x4* | 36x8* | W |
| Wichita, O | 4 | 3900 | 4½x6¼ | 36x5* | 36x5d* | W |
| Wilcox, AA | 1 | 1900 | 3¾x5½ | 36x4* | 36x4* | W |
| Wilcox, BB | 1½ | 2550 | 4¼x5 | 36x4 | 36x5 | W |
| Wilcox, D | 2½ | 3000 | 4¼x5 | 36x4* | 36x3½d* | W |
| Wilcox, E | 3½ | 3950 | 4½x6 | 36x5* | 36x5d* | W |
| Wilcox, F | 5 | 4350 | 4¾x6½ | 36x5 | 40x6d | W |
| Wilson, F | 1½ | 2270 | 3¾x5 | 36x3½ | 36x5 | W |
| Wilson, EA | 2½ | 2825 | 4¼x5¼ | 36x4 | 36x7 | W |
| Wilson, G | 3½ | 3685 | 4½x5½ | 36x5 | 36x5d | W |
| Wilson, H | 5 | 4520 | 4¾x6 | 36x6 | 40x6d | W |
| Winther, 751 | 1 | 1795 | 3½x5 | 34x4½† | 35x5† | I |
| Winther, 430 | 1½ | $2850 | 3¾x5 | 32x4 | 32x4 | I |
| Winther, 39 | 1½ | 2450 | 3¾x5 | 34x3½ | 34x5 | I |
| Winther, 49 | 2 | 3250 | 4 x5 | 34x4 | 34x4d | I |
| Winther, 50 | 2½ | 3995 | 4 x6 | 38x7† | 42x9† | I |
| Winther, 70 | 3½ | 4200 | 4 x6 | 36x5 | 36x5d | I |
| Winther, 450 | 2½ | 3690 | 4 x5 | 34x5 | 36x6 | I |
| Winther, 109 | 5 | 5250 | 4½x6 | 36x6 | 40x5d | I |
| Winther, 140 | 7 | 5900 | 5 x6 | 36x6 | 40x7d | I |
| Wisconsin, B | 1 | 1750 | 3¾x5 | 34x5† | 34x5† | W |
| Wisconsin, C | 1½ | 2500 | 4 x5¾ | 36x6 | 36x6 | W |
| Wisconsin, F | 2 | 3000 | 4⅜x5¾ | 38x7 | 40x8 | .. |
| Wisconsin, D | 2½ | 3500 | 4½x6¼ | 36x6 | 36x10 | W |
| Wisconsin, C | 3½ | 4000 | 5 x6¼ | 36x6 | 36x12 | W |
| Witt-Will, N | 1½ | 2250 | 3¾x5 | 36x3½* | 36x5* | W |
| Witt-Will, P | 2½ | 2750 | 4½x5¼ | 36x3½* | 36x7* | W |
| Wolverine, J | 1 | 2125 | 3½x5 | 34x3 | 34x4 | I |
| Wolverine, J | 1½ | 2375 | 3¾x5 | 34x3½ | 34x5 | I |
| Wolverine, J | 2 | 2640 | 3¾x5 | 34x4 | 34x7 | I |
| Wolverine, J | 2½ | 3425 | 4½x5¼ | 36x5 | 36x10 | I |
| Wolverine, L | 3½ | 4100 | 4½x5½ | 36x5 | 36x10 | I |

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

**Final Drive:** W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

# Farm Tractor Specifications and Prices

| TRADE NAME | Rating | Price | Wheels or Crawlers | Engine | Cylinders: Bore, Stroke | Fuel | Plow Capacity |
|---|---|---|---|---|---|---|---|
| All-In One | 15-30 | $1975 | 3 | Weid. | 4-4 x5½ | GDK | 2-3 |
| Allis-Chalm. B | 6-12 | 925 | 2 | LeR. | 4-3⅛x4½ | Gas. | 1 |
| Allis-Chal.G.P | 14-27 | 795 | 2 | Midw. | 4-4½x5¼ | Gas. | 3 |
| Allis-Chalm. | 18-30 | 2150 | 4 | Own | 4-4¾x6½ | GorK | 3-4 |
| Allis-Chalm. | 22-38 | 875 | 4 | Own | 4-4¾x6½ | G,K | 4 |
| Allwork...2-G | 14-28 | 1775 | 4 | Own | 4-4¾x6 | GorK | 3 |
| Allwork.....C | 14-28 | 1525 | 4 | Own | 4-5 x6 | GorK | 3 |
| AndrewsKin.D | 18-36 | 2400 | 4 | Clim. | 4-5 x6½ | GorK | 4 |
| Appleton | 12-20 | 1500 | 4 | Buda | 4-4¼x5½ | G,K | 2-3 |
| ARO..1921-22 | 3-5 | 495 | 4 | Own | 1-4½x5 | Gas. | 1 |
| Aultman-T. | 15-30 | 2200 | 4 | Clim. | 4-5 x6½ | G,K | 4 |
| Aultman-T. | 22-45 | 3420 | 4 | Own | 4-5½x8 | G,K | 6 |
| Aultman-T. | 30-60 | 4500 | 4 | Own | 4-7 x9 | G,K,D | 8-10 |
| Automot. B-3 | 12-24 | 1785 | 4 | Herc. | 4-4 x5⅛ | Gas. | 2-3 |
| Avery,SR.Cul | 5-10 | .... | 4 | Own | 4-3 x4 | G,K | .. |
| Avery..Cult-C | .... | .... | 3 | Own | 6-3 x4 | G,K | .. |
| Avery.....B | 5-10 | .... | 4 | Own | 4-3 x4 | G,K | 2 |
| Avery.....C | .... | .... | 4 | Own | 6-3 x4 | G,K | .. |
| Avery | 8-16 | .... | 4 | Own | 2-5½x6 | G,K,D | 2-3 |
| Avery | 12-20 | .... | 4 | Own | 4-4½x6 | G,K,D | 3-4 |
| Avery | .... | .... | * | Own | 4-4x5½ | G,K,D | 3 |
| Avery | 12-25 | .... | 4 | Own | 2-6½x7 | G,K,D | 3-4 |
| Avery | 14-28 | .... | 4 | Own | 4-4⅝ | G,K,D | 3-4 |
| Avery | 18-36 | .... | 4 | Own | 4-5½x6 | G,K,D | 4-5 |
| Avery | 25-50 | .... | 4 | Own | 4-6½x7 | G,K,D | 5-6 |
| Avery | 45-65 | .... | 4 | Own | 4-7¾x8 | G,K,D | 8-10 |
| Bates | 15-25 | .... | 4 | Own | 4-4¼x6 | Ker. | 3 |
| Bates Mule.H | 15-25 | .... | 4 | Midw | 4-4⅛x5¼ | Gas. | 3 |
| Bates Mule,.F | 18-25 | .... | *2 | Midw | 4-4⅛x5¼ | Gas. | 3 |
| Bates Mule,.G | 25-35 | .... | *2 | Midw | 4-4½x6 | Gas. | com. |
| Beeman,....G | 2-4 | 315 | 4 | Own | 1-3½x4½ | Gas. | .... |
| Best | 18-30 | 3100 | *2 | Own | 4-4¾x6½ | G,K,D | 4 |
| Best | 60 | 5450 | *2 | Own | 4-6½x8½ | G,K,D | 8-9 |
| Boring...1921 | .... | 1850 | 3 | Wauk | 4-4⅜x5¾ | GorK | 2 |
| Burn-Oil, 1922 | 15-30 | 1495 | 4 | Own | 2-6¼x7 | Ker. | 3-4 |
| Capital | 15-30 | 1000 | 2 | Own | 4-4⅛x6 | Gas. | 3 |
| Case | 10-18 | 800 | 4 | Own | 4-3⅞x5 | GorK | 2 |
| Case | 15-27 | 1680 | 4 | Own | 4-4½x6 | GorK | 3-4 |
| Case | 22-40 | 3100 | 4 | Own | 4-5½x6¾ | GorK | 4-5 |
| Caterpillar T11 | 25 | 3975 | *2 | Own | 4-4¾x6 | Gas. | 4 |
| Caterpillar T16 | 40 | 6050 | *2 | Own | 4-6½x7 | Gas. | 6 |
| Centaur | 5-2½ | 385 | 2 | N Way | 2-4½x4½ | GorK | 1 |
| Chase | 12-25 | 1725 | 3 | Buda | 4-4½x5½ | GorK | 2-3 |
| Chicago....40 | 40 | 2500 | 4 | Own | 4-4½x6 | Gas. | 4 |
| Cletrac.....F | 9-16 | 795 | *2 | Own | 4-3¼x4¼ | G,K,D | 2 |
| Cletrac.....W | 12-20 | 1345 | *2 | Own | 4-4 x5½ | G,K,D | 2-3 |
| Dakota.....4 | 15-27 | 1500 | 3 | Dom, | 4-4¾x6 | Gas. | 3 |
| Dart.....B.J. | 15-30 | 1800 | 4 | Buda | 4-4½x6 | Gas. | 3-4 |
| Depue.....A | 20-30 | 2500 | 4 | Buda | 4-4½x6 | Gas. | 4 |
| Dill.....D | 20 | 2380 | 4 | Cont. | 4-4½x5½ | Gas. | 3 |
| Dill.....R.W. | 20 | 2980 | 4 | Midw. | 4-4½x6 | Gas. | 3 |
| Do-It-All....A | 3-6 | 595 | .. | Own | 1-4½x5 | Gas. | 1 |
| Eagle.....F | 12-22 | .... | 4 | Own | 2-7 x8 | GorK | 3-4 |
| Eagle.....F | 16-30 | .... | 4 | Own | 2-8 x8 | GorK | 4-5 |
| E-B. AA | 12-20 | 1445 | 4 | Own | 4-4¾x5 | G,K,D | 3 |
| E-B.....Q | 12-20 | 925 | 4 | Own | 4-4¾x5 | G,K,D | 3 |
| E-B | 16-32 | 2080 | 4 | Own | 4-5¼x7 | G,K,D | 4 |
| Evans | 18-30 | 2000 | 4 | Buda | 4-4½x6 | G,K | 3 |
| Fageol.....D | 9-18 | 1525 | 4 | Lyc. | 4-3½x5 | Gas. | 2 |
| Farm Horse.B | 18-30 | 1885 | 4 | Clim. | 4-5 x6½ | G,K | 4 |
| Farquhar | 15-25 | .... | 4 | Buda | 4-4½x6 | G,K,D | 3-4 |
| Farquhar | 18-35 | .... | 4 | Own | 4-6 x8 | G,K,D | 4-5 |
| Farquhar | 25-50 | .... | 4 | Own | 4-7 x8 | G,K,D | 6-7 |
| Fitch.....4 | 20-35 | .... | 4 | Clim. | 4-5 x6½ | GorK | 3-4 |
| Flour City | 20-35 | .... | 4 | Own | 4-5¼x6 | Ker. | 4-6 |
| Flour City | 30-50 | .... | 4 | Own | 4-6¾x7 | Ker. | 6-8 |
| Flour City | 40-70 | .... | 4 | Own | 4-7½x9 | Ker. | 8-10 |
| Fordson | -18 | 395 | 4 | Own | 4-4x5 | G,K | 2 |
| Fox.....E | 20-40 | 3100 | 4 | Own | 4-5½x7½ | G or K | 4 |
| Franklin....G | 18-30 | 4000 | *2 | Clim. | 4-5 x6½ | G or K | 3-4 |
| Franklin....C | 18-30 | 3350 | *2 | Clim. | 4-5 x6½ | G or K | 3-4 |
| Franklin...G2 | 18-30 | 4350 | 2 | Clim. | 4-5 x6½ | G or K | 3-4 |
| Frick.....A | 12-20 | .... | 4 | Erd. | 4-4 x6 | G,K | 2-3 |
| Frick.....C | 15-28 | .... | 4 | Beav. | 4-4¾x6 | G,K | 3-4 |
| Grain Belt...A | 18-36 | $2150 | 4 | Wauk. | 4-4¾x6¾ | G or K | 4 |
| Gray.....1920 | 18-36 | 2000 | 3 | Wauk | 4-4¾x6¾ | Gas. | 4 |
| Ground Hog.. | 19-31 | 2000 | 4 | Erd. | 4-4 x6 | G or K | 3 |
| Gt. Western St | 20-30 | 1950 | 4 | Beav. | 4-4¾x6 | K | 4 |
| Hart-Parr..20 | 20 | 945 | 4 | Own | 2-5¼x6½ | K,D. | 2 |
| Hart-Parr..30 | 30 | 1295 | 4 | Own | 2-6½x7 | K,D. | 3 |
| Heider.....D | 9-16 | 870 | 4 | Wauk | 4-4¼x5¾ | G,K | 2 |
| Heider.....C | 12-20 | 995 | 4 | Wauk | 4-4½x6¾ | G,K | 3 |
| Heider...Cult | 6-10 | 1050 | 4 | LeR. | 4-3½x4½ | Gas. | 1 |
| Hicks | 20-30 | .... | 4 | .. | 4-4½x6 | K or G | 4 |
| Huber Light 4 | 12-25 | 1185 | 4 | Wauk | 4-4½x5¾ | G or K | 3 |
| Huber Super 4 | 15-30 | 1885 | 4 | Midw. | 4-4½x6 | Gas | 3 |
| Illinois, Super-Drive.....C | 15-30 | .... | 4 | Clim. | 4-5 x6½ | G,K | 4 |
| Imperial...E | 40-70 | 4500 | 4 | Own | 4-7½x9 | G,K,D | 10 |
| Indiana.....F | 5-10 | 895 | 2 | LeR. | 4-3⅛x4½ | Gas. | 1-2 |
| International . | 8-16 | †670 | 4 | Own | 4-4¼x5 | G,K,D | 2 |
| Internatl.Titan | 15-30 | †700 | 4 | Own | 4-5¼x8 | G,K,D | 4 |
| J-T.....N | 20-40 | .... | *2 | Chief. | 4-4¾x6 | G,K,D | 3-4 |
| Klumb.....F | 18-32 | 1475 | 4 | Clim. | 4-5 x6½ | .... | .. |
| Knudsen.1920 | 25-45 | 2500 | 4 | Own | 4-5⅞x9 | Gas | 4-6 |
| LaCrosse...M | 6-12 | 650 | 4 | Own | 2-4 x6 | G,K | 1 |
| LaCrosse...G | 12-24 | 985 | 4 | Own | 2-6 x7 | G or K | 3 |
| Lauson.....5 | 12-25 | 1495 | 4 | Midw. | 4-4⅛x5¼ | Gas. | 3 |
| Lauson.....20 | 15-25 | 1685 | 4 | Beav. | 4-4½x6 | G or K | 3-4 |
| Lauson.....21 | 15-30 | 1985 | 4 | Beav. | 4-4¾x6 | G or K | 3-4 |
| Lauson Road . | 15-30 | 2225 | 4 | Beav. | 4-4¾x6 | K | .. |
| Leader.....B | 12-18 | 1095 | 4 | Own | 2-6 x6¼ | G,K,D | 2-3 |
| Leader.....M | 16-32 | 1985 | 4 | Clim. | 4-5 x6½ | G,K | 3-4 |
| Leader....GU | 18-36 | 2775 | *2 | Clim. | 4-5 x6½ | G,K | 3-4 |
| Leonard.....E | 20-30 | 2530 | 4 | Buda | 4-4½x6 | G,K | 3 |
| Linn.....H4J | 40- | 4500 | * | Cont. | 4-4½x5½ | Gas | 4 |
| Linn.....W | 60 | 5100 | * | Wauk | 4-5 x6¼ | Gas | 6 |
| Little Giant, B | 16-22 | 2200 | 4 | Own | 4-4½x5 | K | 4 |
| Little Giant, A | 26-35 | 3300 | 4 | Own | 4-5½x6 | K | 6 |
| Lombard.1921 | 85-150 | .... | *2 | .... | 6-5½x6¾ | Gas. | 16 |
| Lombard.1921 | 50 | .... | *2 | .... | 4-4¾x6½ | .... | 6-10 |
| Magnet.....B | 14-28 | 1875 | 4 | Wauk | 4-4½x6¼ | K&G | 3 |
| Master Jr..... | 5-10 | 585 | | LeR. | -2⅜x4 | Gas. | 1 |
| MerryGa.1921 | 2 | 230 | 2 | Evin | 1-2⅝x2½ | Gas. | .. |
| Minne...All-P | 12-25 | 900 | 4 | Own | 4-4½x7 | G or K | 3 |
| Minne. Gen.P | 17-30 | 1675 | 4 | Own | 4-4¾x7 | G or K | 3-4 |
| Minne. Med.Duty | 22-44 | 3000 | 4 | Own | 4-6 x7 | G or K | 5-6 |
| Minne. HeavyDuty | 35-70 | 4150 | 4 | Own | 4-7¼x9 | G or K | 8-9 |
| Mohawk .1921 | 8-16 | 785 | 2 | Light | 4-3¼x4½ | K or G | 1-2 |
| Moline Univ D | 9-18 | 990 | 2 | Own | 4-3½x5 | Gas. | 2-3 |
| Moline Orch.. | 9-18 | 1075 | 2 | Own | 4-3½x5 | Gas. | 2-3 |
| Motor Macult. | 1½ | 195 | 2 | Own | 1-2¾x3½ | Gas. | .. |
| Motox | 15-30 | 2250 | 4 | Buda | 4-4½x6 | Gas. | 3-4 |
| NB.....1 | 3-6 | 425 | 4 | Own | 2-3¾x4 | Gas. | 1 |
| Nichols-Shep. 20-42. | 20-42 | 3100 | 4 | Own | 8 x10 | G or K | 3-6 |
| Nichols Shep. 25-50 | 25-50 | 3460 | 4 | Own | 9 x12 | G or K | 4-7 |
| Nilson Senior.. | 20-40 | 2475 | 5 | Wauk | 4-5 x6¼ | G,K | 4 |
| Oil Pull.....K | 12-20 | 1485 | 4 | Own | 2-6 x8 | K,D | 3 |
| Oil Pull.....H | 16-30 | 2285 | 4 | Own | 2-7 x8½ | K,D | 4 |
| Oil Pull.....G | 20-40 | 3175 | 4 | Own | 2-8 x10 | K,D | 5-6 |
| Oil Pull.....E | 30-60 | 4590 | 4 | Own | 2-10x12 | K,D | 8-10 |
| Oldsmar GarK | 2½-5 | 395 | 4 | Own | 1-5½x5½ | Gas. | 1 |
| Oliver.....A | 15-30 | .... | *2 | Beav. | 4-4½x6 | G or K | 3-4 |
| Once Over Tiller Mark..6 | 12-25 | 3000 | 4 | Strns | 4-4½x6 | Gas. | 2 |
| Parrett.....K | 15-30 | 1950 | 4 | Pitt | 4-4½x6 | G,K | 3 |
| Peoria.....L | 12-25 | 1600 | 4 | Clim. | 4-5 x6½ | G,K | 3 |
| Pioneer.....G | 20-40 | .... | 4 | Own | 4-5½x6 | G,K,D | 4 |
| Pioneer.....C | 40-75 | .... | 4 | Own | 4-7 x8 | Gas. | 10 |
| Plowman....A | 15-30 | 1695 | 4 | Buda | 4-4½x6 | G,K | 3-4 |
| Port Huron..A | 12-25 | $1500 | 4 | Chief | 4-3¾x6 | G,K | 3 |
| Ranger Cul. T-20 | 8-16 | .... | 4 | LeR. | 4-3½x4½ | Gas. | 1 |
| Reed.....A | 15-30 | 1985 | 4 | Wauk | 4-4½x6¼ | G or K | 3-4 |
| Reed.....A-1 | 18-36 | 2185 | 4 | Wauk | 4-5 x6¼ | Gas. | 4 |
| Reliable | 10-20 | 885 | 4 | Own | 2-6 x7 | Ker. | 2 |
| Rex | 12-25 | 1600 | 4 | Wauk | 4-4¼x5¾ | G or K | 3 |
| Russell | 12-24 | 1500 | 4 | Own | 4-4¼x5¾ | G or K | 2-3 |
| Russell | 15-30 | 2200 | 4 | Own | 4-5 x6½ | G or K | 3-4 |
| Russell | 20-35 | 3000 | 4 | Own | 4-5½x7 | G or K | 4-5 |
| Russell | 30-60 | 5000 | 4 | Own | 4-8 x10 | G or K | 8-10 |
| Samson....M | .... | 445 | 4 | Own | 4-4 x5½ | G,K | 2 |
| Sandusky,...J | 10-20 | 1250 | 4 | Own | 4-4¼x5¼ | G,K,D | 2 |
| Sandusky...E | 15-35 | 1750 | 4 | Own | 4-5 x6½ | G,K,D | 4 |
| Shawnee Com. | 6-12 | .... | 2 | LeR. | 4-3⅛x4½ | Gas. | 1 |
| Shawnee Com. | 9-18 | .... | 2 | Gray | 4-3½x5 | .. | .. |
| Shelby.....D | 15-30 | .... | 4 | Beav. | 4-4¾x6 | G,K | 3 |
| Shelby.....C | 9-18 | .... | 4 | Wauk | 4-3¾x5¼ | G or K | 2 |
| Short Turn... | 20-40 | 1500 | 3 | Beav. | 4-4¾x6 | G,K | 3 |
| Steady Pull.. | 12-24 | 1485 | 4 | Own | 4-4 x5 | Gas. | 3 |
| Stinson....4E | 18-36 | 1835 | 4 | Beav. | 4-4¾x6 | G,K | 4 |
| Stone | 20-40 | 2250 | 4 | Beav. | 4-4¾x6 | G,K | 4 |
| Tioga.....3 | 15-27 | 2625 | 4 | Wisc. | 4-4½x6 | Gas. | 3-4 |
| Topp-Stewart...B | 30-45 | 3500 | 4 | Wauk | 4-4¾x6¾ | Gas. | 3-4 |
| Toro Cultivator | 6-10 | .... | 3 | LeR | 4-3½x4½ | Gas. | 2 |
| Townsend.... | 10-20 | 895 | 2 | Own | 4-6½x7 | Ker. | 2-3 |
| Townsend.... | 15-30 | 1485 | 2 | Own | 4-7 x8 | Ker. | 3-4 |
| Townsend.... | 25-50 | 2750 | 2 | Own | 4-8½x10 | Ker. | 4-8 |
| Traction Motor | 40-50 | .... | 4 | .. | 8-3½x5 | Gas. | 4-5 |
| Traylor....TB | 6-12 | 715 | 4 | LeR. | 4-3½x4½ | Gas. | 1-2 |
| Triumph....H | 18-36 | 2450 | 2 | Erd. | 4-4¾x6 | Ker. | 4 |
| Trundaar...10 | 25-40 | 3750 | *2 | Wauk | 4-5 x6½ | G or K | 4 |
| Turner...1921 | 14-25 | 1295 | 4 | Buda | 4-4¼x5½ | G,K | 3 |
| Twin City.... | 12-20 | 1580 | 4 | Own | 4-4¼x6 | G,K | 3 |
| Twin City.... | 20-35 | 3175 | 4 | Own | 4-5½x6¾ | G,K | 5 |
| Twin City.... | 40-65 | 5250 | 4 | Own | 4-7¾x9 | G,K | 8 |
| Uncle Sam C20 | 12-20 | 1385 | 4 | Weid. | 4-4 x5½ | G | 2-3 |
| Uncle Sam B19 | 20-30 | 2300 | 4 | Beav. | 4-4¾x6 | G or K | 3-4 |
| Uncle Sam D21 | 20-30 | 1985 | 4 | Beav. | 4-4¾x6 | G or K | 3-4 |
| Universal..... | 1-4 | 475 | 2 | Own | 1-3½x5 | G | 1 |
| Utilitor....501 | 2½-4 | 380 | 4 | Own | 1-3½x4½ | G | 1 |
| Vim.....B | 15-30 | 1650 | 4 | Wauk | 4-4⅜x5¾ | G,K | 3 |
| Wallis.....K | 15-25 | †995 | 4 | Own | 4-4¼x5¾ | G,K | 3 |
| Waterloo....N | 12-25 | 675 | 4 | Own | 2-6½x7 | G,K | 3 |
| Webfoot....53 | 28-53 | 5000 | *2 | Wisc. | 4-5¾x7 | G,D | 6 |
| Wellington..B | 12-22 | .... | 4 | Erd | 4-4 x6 | Ker. | 2-3 |
| Wellington..F | 16-30 | .... | 4 | Chief | 4-4¾x6 | Ker. | 3-4 |
| Western, 1920 | 16-32 | 2100 | 4 | Clim. | 4-5 x6½ | Gas. | 4 |
| Wetmore21-22 | 12-25 | 1585 | 4 | Wauk | 4-4 x5¾ | G,K | 3 |
| Whitney....D | 9-18 | 595 | 4 | Own | 2-5½x6½ | Gas. | 2 |
| Wichita.....T | 15-30 | 2000 | 4 | Beav. | 4-4½x6 | G,K,D | 3-4 |
| Wisconsin...E | 16-30 | 2250 | 4 | Clim. | 4-5 x6½ | G or K | 3 |
| Wisconsin...F | 20-40 | 2450 | 4 | Wauk | 4-5 x6¼ | G or K | 4 |
| Wisconsin,..H | 22-40 | 3200 | 4 | Clim. | 4-5½x7 | G or K | 4-6 |
| Yuba....12-20 | 12-20 | 2600 | *2 | Wisc. | 4-4½x6¾ | G,K,D | 3 |
| Yuba....15-25 | 15-25 | 3100 | *2 | Wisc. | 4-4¼x6 | G,K,D | .. |
| Yuba....23-35 | 20-35 | 4185 | *2 | Wisc. | 4-5¾x7 | G,K,D | 4 |
| Yuba....25-40 | 25-40 | 4650 | *2 | Wisc. | 4-5¾x7 | G,K,D | .. |
| Zelle | 12-25 | .... | 4 | Buda | 4-4¼x5½ | G or K | 3 |

ABBREVIATIONS: G—Gasoline. K—Kerosene. D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav—Beaver. Clim.—Climax. Cont.—Continental. Dom.—Domas. Evin.—Evinrude. Herc.—Hercules. LeR—LeRoy. Midw.—Midwest. Nway.—New Way. Nor.—Northway. Strns.—Stearns. T.C.—Twin City. Wauk.—Waukesha. Weid.—Weidely. Wis—Wisconsin. *—Crawler type. All others are wheel type. †Price includes plows.

# COMING MOTOR EVENTS

## AUTOMOBILE SHOWS

| | | |
|---|---|---|
| Albany | Automobile Dealers' Assn | Feb. 18-25 |
| Ft. Wayne, Ind. | Automobile Show | Feb. 18-25 |
| Hartford, Conn. | Hartford Automobile Dealers' Assn. | Feb. 18-25 |
| St. Louis | Mfrs. and Dealers' Show | Feb. 18-25 |
| San Jose, Calif. | Automobile Trade Assn | Feb. 18-25 |
| Salt Lake City | Automobile Show | Feb. 20-25 |
| Duluth, Minn. | Automobile Show | Feb. 20-25 |
| Dallas, Tex. | Automobile Show | Feb. 20-25 |
| Bethlehem, Pa. | Automobile and Accessory Show | Feb. 20-25 |
| Louisville, Ky. | 14th Annual Automobile Show | Feb. 20-25 |
| Syracuse | 14th Annual Automobile Show | Feb. 20-25 |
| Gr. Rapids, Mich. | Michigan Automotive Trade Assn. | Feb. 20-25 |
| Norfolk, Va. | Automobile Show | Feb. 20-25 |
| Deadwood, S. D. | Deadwood Business Club | Feb. 21-25 |
| Ottumwa, Iowa | Automobile Show | Feb. 22-25 |
| Clinton, Ia. | Automobile Show | Feb. 22-25 |
| Trenton, N. J. | Car, Truck & Accessory Show | Feb. 22-25 |
| Springfield, Ill. | Automobile Show | Feb. 23-25 |
| Pensacola, Fla. | Automobile Show | Feb. 25-27 |
| Montreal | Automobile Show | Feb. 25-Mar. 4 |
| Des Moines | Winter Automobile Show | Feb. 26-Mar. 3 |
| Niagara Falls | Automobile Show | Feb. 27 |
| Bethlehem, Pa. | Truck and Tractor Show | Feb. 27-28 |
| Amsterdam, N. Y. | Automobile Show | Feb. 27-Mar. 4 |
| Bridgeport, Conn. | Automobile Show | Feb. 27-Mar. 4 |
| Glen Falls, N. Y. | Automobile Show | Feb. 27-Mar. 4 |
| Elmira, N. Y. | Elmira Automobile Club | Feb. 27-Mar. 4 |
| Jamestown, N.Y. | Automobile Show | Feb. 27-Mar. 4 |
| Muskegon, Mich. | Michigan Automotive Trade Assn. | Feb. 27-Mar. 4 |
| Paterson, N. J. | Automobile Show | Feb. 27-Mar. 4 |
| Portland, Ore. | Portland Dealers' Assn | Feb. 27-Mar. 4 |
| Springfield, Mass. | 7th Annual Automobile Show | Feb. 27-Mar. 4 |
| Windsor, Ont. | Automobile Show | Feb. 27-Mar. 4 |
| Bay City, Mich. | Michigan Automotive Trade Assn. | Feb. 28-Mar. 4 |
| Wichita, Kan. | Wichita Motor Trade Assn | Feb. 28-Mar. 4 |
| Harrisburg, Pa. | Automobile Show | March |
| Ardmore, Okla. | Ardmore Automobile Dealers' Assn | March |
| Madison, Wis. | Automobile Show | March |
| San Antonio | Automobile Trades Assn | March |
| Evansville, Ind. | Eighth Annual Automobile Show | Mar. 1- 4 |
| Asheville, N. C. | Automobile Show | Mar. 2-4 |
| Youngstown | Youngstown Dealers' Assn | Mar. 4-11 |
| Brooklyn | Eleventh Annual Show | Mar. 4-11 |
| Saginaw, Mich. | Michigan Automotive Trade Assn. | Mar. 6-10 |
| Camden, N. J. | Automobile Trade Assn | Mar. 6-11 |
| Indianapolis | Annual Automobile Show | Mar. 6-11 |
| Nashville | Nashville Automobile Trades Assn. | Mar. 6-11 |
| Yonkers, N. Y. | Automobile Show | Mar. 6-11 |
| Wilmington, Del. | Wilmington Trade Assn | Mar. 6-13 |
| Newburgh, N. Y. | Automobile Show | Mar. 8-11 |
| Amarillo, Tex. | Automobile Show | Mar. 10-11 |
| Antigo, Wis. | Automobile Show | Mar. 10-12 |
| Denver | Denver Automobile Trade Assn | Mar. 10-20 |
| Boston | Annual Automobile Show | Mar. 11-18 |
| Newark, N. J. | Newark Automobile Dealers' Assn. | Mar. 11-18 |
| Spartanburg, S. C. | Piedmont Exposition | Mar. 13-18 |
| Boston | Automobile Salon | Mar. 13-13 |
| Omaha | Omaha Automobile Trade Assn | Mar. 13-18 |
| Great Falls, Mont. | Automobile Show | Mar. 13-18 |
| Greensboro, N. C. | Automobile Show | Feb. 14-18 |
| Port Huron, Mich. | Michigan Automotive Trade Assn. | Mar. 15-18 |
| Logansport, Ind. | Automobile Show | Mar. 16-18 |
| Torrington, Conn. | Automobile Show | Mar. 20-25 |
| White Plains, N.Y. | Automobile Show | Mar. 20-25 |
| Ypsilanti, Mich. | Michigan Automotive Trade Assn. | Mar. 21-22 |
| Denver, Colo. | Automobile Show | Mar. 22-25 |
| Herkimer, N. Y. | Automobile Show | Mar. 23-25 |
| Kingston, N. Y. | Automobile Show | Mar. 23-25 |
| Ann Arbor, Mich. | Michigan Automotive Trade Assn. | Mar. 24-25 |
| Wash'ton, City of. | Automobile Trade Assn | Mar. 25-Apr. 1 |
| Jacksonville, Ill. | Automobile Show | Mar. 27 |
| Oklahoma City | Automobile Show | Mar. 27-Apr. 1 |
| Torrington, Conn. | Automobile Show | Mar. 27-Apr. 1 |
| Ben. Harb., Mich. | Michigan Automotive Trade Assn. | Mar. 28-31 |
| Quincy, Ill. | Automobile Show | Mar. 28-Apr. 1 |
| Bridgeport, N. J. | Automobile Show | Apr. 1- 8 |
| Bat. Creek, Mich. | Michigan Automotive Trade Assn. | Apr. 2- 8 |
| New York City | Electric Automobile Show | Apr. 3-15 |
| Buffalo, N. Y. | Motors and Sportsmen's Show | Apr. 10-15 |
| Wins.-Salem, N. C. | Automobile Show | Apr. 11-17 |
| Goldsboro, N. C. | Automobile Show | Apr. 18-22 |
| Chicago | Used Car Show | Apr. 26-May 4 |
| Hartford, Conn. | Automobile Show | Sept. 4- 9 |

## FOREIGN SHOWS

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|---|---|---|
| London, England | Automobile Show | Feb. 6-11 |
| Santiago, Cuba | Annual Automobile Show | March, 1922 |
| Mexico City | Automobile Show | Apr. 16-23 |
| Rio de Janeiro | Automotive Exhibition | Sept., 1922 |

## CONVENTIONS

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| Wichita, Kans. | Threshermen's Convention | Feb. 21-24 |
| Decatur, Ill. | 3rd Annual Convention, Illinois Automotive Trade Assn | Mar. 20 |

## Cross-Country Locomotive

THIS extraordinary looking vehicle is a gas-propelled locomotive. Almost every part from frame to whistle was especially built and designed by F. A. Sternad, designing engineer of the Chicago Solder Co., Chicago.

Every locomotive feature has a part to play in its operation. The cylinder and connecting rods on the sides that correspond to the driving parts of a steam locomotive are actual pumps that compress air up to 125 lb. pressure in the tank behind the cab. This compressed air is used to inflate tires and to blow the whistle. The "steam dome" in front of the cab affords access to the gasoline tank. The "sand dome" provides an opening for ventilating the motor. The "smoke stack" is the opening to the radiator. What looks like "clean out doors" forward of and just below the cab, are handy ventilators for the cab; the "air brake cylinders" above these doors are an auxiliary air supply for the whistle.

The four-cylinder, 40-hp. motor will drive the cross-country locomotive at a speed of 60 miles per hour.